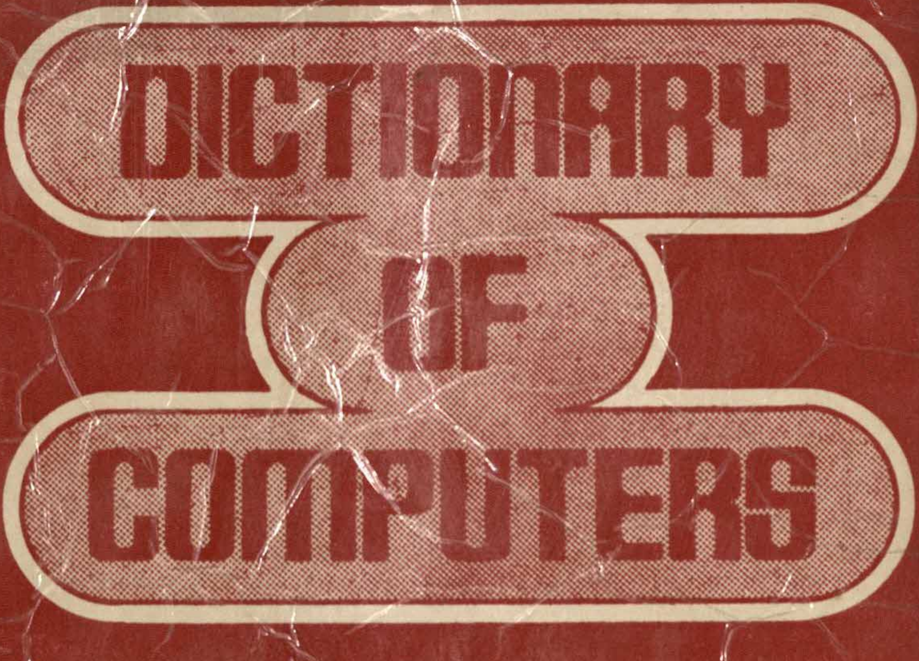

DICTIONARY OF COMPUTERS

MADAN L. NARANG

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by

MADAN L. NARANG
M. Sc. Ph.D.

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Preface

As computer technology infiltrates our society and now people intrigued, involved and confused by new terms and new meanings for old terms, definitions have to be constantly updated and refined. This dictionary includes the most frequently used words and terms involved in the purchase and use of a computer. An attempt has been made to select the terms carefully because these are most likely to comfort the novice when dealing with this emerging language within a language. Further, emphasis has also been laid on the latest in graphics, telecommunications and education. As an aid in handling potential problems likely to arise during use of the computer, an attempt has been made to include terms that relate to potential malfunctions and to error handling routines.

The dictionary will be of value to students of computer science, scientists and storekeepers, clerks and directors, accountants and engineers.

The author is happy to give credit here to all those who had a hand in getting the dictionary into its present form and particularly to put on record my great debt to Dr. Mohan Katyal for the care and interest he took in clearing up complex points to that they might be put in simple English.

In compiling a dictionary of this kind it becomes necessary to draw upon the work of many authorities and seek the advice of colleagues to all of whom the author is deeply indebted.

Finally the author expresses his sincere thanks to the publishers and printer for printing this book promptly.

All comments from users on omissions or shortcomings will be most welcome.

July, 1987

Dr. Madan L. Narang
M.Sc. Ph.D.

A

Abend. Abnormal ending (acronym, pronounce as one word). Early termination of a computer program due to an error.

Aberration. The term used for a defect in the electronic lens system of a cathode ray tube.

Abnormal Termination. *Termination* which occurs when an error condition is detected by hardware, revealing that a particular series of actions previously initiated cannot be completed correctly.

Abort. To stop or cancel a procedure or selection in progress deliberately.

Absolute Address. The address that is the actual, physical location in storage for a piece of data, which the control unit can address directly. It is also known as actual address, direct address, machine address, real address, specific address.

Absolute Addressing. Means *address locations* in *store* by their *absolute addresses.*

Absolute Code. A programming code which is using *absolute addresses* and *operators.* It is also known as actual code, direct code, one level code and specific.

Absolute Coding. Program instructions written in absolute code. They do not need further processing before being intelligible to the computer.

Absolute Error. Refers to the magnitude of deviation of a computed result irrespective of the sign.

Absolute Maximum Rating. Refers to a machine's maximum limits with respect to the environment in which it can function, as given in its specifications, and which should not be exceeded.

Absolute Value Computer. A computer in which data is being processed in its absolute form, all variables keeping their full values ; contrasted with *incremental computer* in which changes in the variables are processed as well as the values of the variables themselves.

Acceleration Time. The time elapsing between the interpretation of an *instruction* to a *peripheral unit* to *read* or *write,* and the moment when transfer of information from the unit to *store* or vice versa could start, *e.g.,* the time taken for accelerating the *tape transport* on a *magnetic tape* unit.

Access. The ability to get data from and/or place it into memory.

Access Arm. A device which is employed to position the reading and writing mechanisms of a *storage device.*

Access Control Register. A *register* which is used to record the *access level* allocated to an active procedure.

Access Level. In many computer systems there exist a number of levels at which control mechanisms (*hardware* and *software*) may exist to disallow interference between modules of software. These access levels are numbered for represanting different degrees of *security.*

Access Method. Refers to the way in which data in a file has been selected for processing ; *e.g.*, a *direct access storage* system can contact files which have been accessed in a number of different ways—*serial access, random access*, and *selective sequential access.*

Access Permission. A response which is given to an attempt for initiating a software routine, when access control mechanisms have a scertained that the attempt possesses correct status and satisfies predetermined security checks.

Access Right. The level of *access* which is granted to users of a system ; *e.g., read* a *file* only, or *write* to a file.

Access, Simultaneous. Synonymous with *parallel access.*

Access Time. The time it takes for information to become available once it has been called for through a control signal.

Accountable File. A *file* whose use is only taken into account when a system gets evaluated, as opposed to *pass-through* files which possess an ephemeral use only.

Accountable Time. Means the time in which a computer system becomes available to users, and excludes time when the computer gets switched off ; undergoing scheduled or unscheduled maintenance ; or closed down due to external factors.

Accounting Journal. A journal which is maintained as a file by an *operating system* for recording events relating to various jobs which are active in the computer and to provide a basis for subsequent analysis so as to assess charges to users.

Accounting Machine. *Keyboard* machines which prepare accounting records ; more specifically a *punched card tabulator* which is capable of reading cards and producing lists and totals.

Accumulator. A location within the arithmetic and logic unit that temporarily stores the results of arithmetic or logical operations. A computer often possesses more than one accumulator.

Accumulator Register. Synonymous with *accumulator.*

Accuracy. Refers to the size of error, or range of errors, the degree of conformity to a rule. High accuracy means small error, but accuracy is contrasted with precision, *e.g.*, three places of decimals properly computed are less precise but more accurate than four places of decimals having an error.

Accuracy Control Characters. Characters indicating whether data is incorrect, may be disregarded, or is not valid for representation on the device being used.

AC Dump. Refers to the removal of all alternating current from a system or part of a system; this may be intentional or accidental.

ACK. Acknowledge (acronym, pronounce as one word).

Acknowledge. (ACK). A control signal verifying that a block of transmitted information has been accepted by the receiver.

ACM. Abbreviation for association for computer machinery.

Acoustic Coupler

Acoustic Coupler. A device which is usually used with a modem, that allows a telephone to transmit digital data over an ordinary telephone line. The coupler allows the telephone headset to be placed in a cradle, linking the computer at one end of the phone line and a peripheral device at the other. *See modem*.

Acoustic delay Line. A *delay line* having a medium which reacts to the propagation of sound waves. It is also termed as sonic delay line.

Acoustic Memory. Synonymous with *acoustic store*.

Acoustic store. A *regenerative store* using an *acoustic delay line*. Also known as acoustic memory, delay line store.

Acronym. A word which is formed from the initial letter or letters of each of the successive parts (or major parts) of a compound term. The result is almost always expressed in capital letters. The letters could be pronounced individually or read as a word; for example, CPU=Central Processing Unit, with each letter pronounced individually.

Action Message. Means a message which is generated by a *program* or an *operating system* revealing that a condition has taken place requiring operator action.

Action Period. Refers to the time during which data stored in a *Williams tube store* may be read or new data may be written to the store.

Active Element. 1. That part of a computer system which is capable of carrying out operations. 2. A circuit which is receiving energy from a source other than a main input signal.

Active Star. A *network* in which the external *nodes* are all connected to a single central node, which processes all messages from external to central and from external, via central, to external. Refer to *network architecture.*

Activity. In PERT and *critical path method* an activity is the representation on the network of an actual task consuming time and resources which are necessary for progress from one *event* to another.

Activity Ratio. Refers to the ratio of the number of *records* which have moved in a *file* being updated to the total number of records in that file.

Actual Decimal Point. A decimal point appearing on a screen or as a printed character on a *print-out* and for which an actual *location* is allowed in *store.*

Actuator. 1. Any device which, under the control of a signal, can undertake mechanical action. 2. The mechanism of a *magnetic disk drive* causing the *read/write head* to be moved to the *track.*

A/D. Analog/Digital (acronym, pronounce letters individually).

Ada. A high level language which was developed by the U.S. Department of Defense. It was designed to establish a common language for all of its military computer projects. Ada compilers and their use are becoming more widespread. The most unique and revolutionary aspect of the language is its ability to recognize English-like words for easy use. Its organization relies on building block modules and encourages combinations of smaller units into hierarchies and nested structures.

Adaptive Channel Allocation. A method to control a communication channel by using an *adaptive control system* so that the channels get allocated in accordance with changing requirements rather than in a fixed pattern.

Adaptive Control System. A control system continuously monitoring its own behaviour and, by adjusting its *parameters* it is able to suit itself to a changing environment.

Adaptive Routing. Refers to a method of *routing* messages on a *network* in which the route gets adapted to avoid line failures or to cope with a new traffic pattern.

Add. The process of increasing or decreasing (if adding a negative number) a number using an arithmetic operation involving a second number.

Addend. One of the *operands* used in carrying out the function of addition. A distinction is generally drawn between the addend and its counterpart the *augend.*

Adder. A device which is carrying out the function of addition using digital signals. It receives three inputs which represent *addend, augend* and a *carry* digit but will provide two outputs which represent the *sum* and a carry digit.

Adder-Subtractor. A devise either acting as an *adder* or a *subtracter.*

Addition Record. If *a file* is being updated a *record* added to the file, as opposed to one which amends an existing record, is termed as an addition record.

Addition table. Computers using table *look-up* techniques for addition, the area of memory holding the table of numbers to be used is termed as the addition table.

Add-On. The ability to increase memory capacity, modify architecture or otherwise upgrade performance or capability, by, attaching circuitry or components.

Address. An identification, represented by a name, label or number, for a register or location in storage.

Address Bus. A *bus* which is used only for the transmission of *address data.*

Address Computation. Refers to an operation on the *address* part of a *program instruction.*

Address Format. The way in which the *address* part of an *instruction* has been arranged.

Address Generation. A technique which is used to retrieve *records* from a randomly stored *direct access file.*

Addressing. The method which is used to identify the location of a participant in a network. Ideally, addressing specifies where the participant is located rather than who they are (see name) or how to get there (see routing). This has been true for *flat addressing*, in which addresses are assigned independently of each other and carry no internal structure. More common, however, is *hierarchical addressing*, in which addresses have been grouped to reflect relationships among the addressed entities. Often the grouping reflects the physical topology of the network, so addressing and routing are interrelated. Somtimes the grouping reflects administrative or functional relationships (*logical addressing*) so addressing and naming are interrelated.

Addess, Instruction. The *address* of a *location* having an *instruction.*

Address Mapping. Refers to the conversion of data which is used to represent the physical location of *fields* or *records* and the process by which records or *blocks* of information have been assigned to *storage* locations. For example, the translation of a *virtual address* to an *absolute address* or *real address.*

Address Modification. Refers to the process of changing the *address* part of an *instruction* by using a modifier, so that the instruction will operate upon a different *operand* each time the *routine* having the instruction is carried out.

Address Part. Refers to the part of an *instruction* in which is given the *location* of an *operand.*

Address Register. A *register* in which an *address* is being stored.

Address Track. A *track* on a *storage device* (*e.g., on a magnetic drum*) which has *addresses* to facilitate *access* to data stored on other tracks.

Address Translation Slave Store. A *hardware* entity which is used to assist in the translation of *addresses, e.g.*, a virtual *address* to a *real address.*

Add-subtract Time. The time required by a computer to add or subtract, exclusive of the *read time* or *write time.*

Add time. The time required by a computer to carry out one addition, exclusive of the *read time* or *write time.*

ADP. Automated Data Processing (acronym, pronounce letters individually).

Advance Feed Tape. *Paper tape* in which the leading edge of the *feed holes* is in line with the leading edge of the (larger) character holes, thereby making it possible to distinguish between the front end and the tail end of a piece of perforated tape.

Adventure. A popular computer game that originated on mainframe computers, but has been adapted to microcomputers. The player overcomes underground dangers while seeking treasure. It is also a genre.

After-Look Journalizing. In a system in which extensive recovery facilities are required to safeguard against system failure, a journal is made of amendments to files. This term indicates that an entry is made to the journal after each change made to the file concerned.

Agenda. A set of operations forming a procedure for solving a problem. In *linear programming*, a group of programs are used to manipulate a problem matrix.

Agendum call card. In *linear programming*, a *punched card* having one item of an *agenda* used for manipulating a problem matrix.

AI. Artificial Intelligence (acronym, pronounce letters individually).

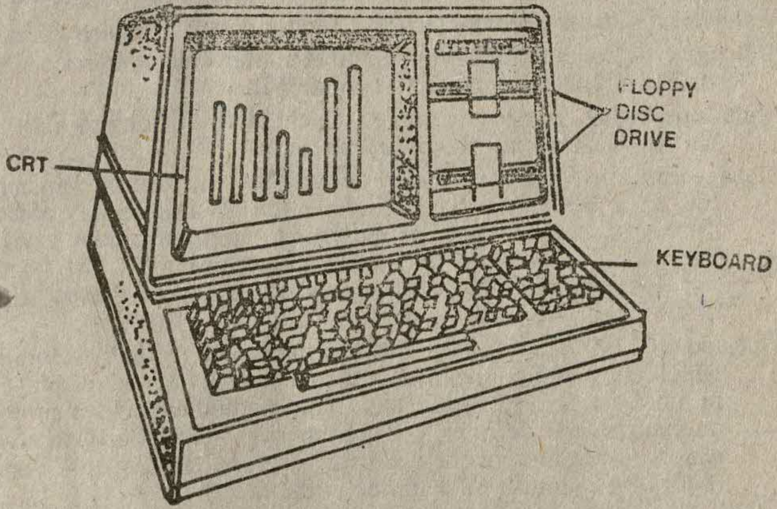
Alarm System. A system that sends an alarm indicator for display when a critical deviation from normal input/output conditions takes place.

Algol. *Acronym for* algorithmic language. It is the generic name for a family of high-level languages of great importance in the development of computing. In 1958 the Association for Computing Machinery (ACM) in the US and the Gessellschaft fur Angewante Mathematik and Mechanik (GAMM) in Europe defined an *international algorithmic language* (*IAL*). The language that was designed became known as *Algol* 58 to distinguish it form later versions. Alogol 58 was not intended to be a viable language, and in 1960 an augmented committee was asked to devise the second iteration, which was published as the language *Algol 60*. It introduced many new concepts, notably block structure (*see* blockstructured languages), nested scopes, modes of parameter passing to procedures, and the definition of the language introduced the now classic BNF notation for describing syntax. In the years following the publication of the Alogal 60 Report, a working group of the International Federation for Information Processing (IFIP—WG 2.3) was set up which proposed the language *Algol 68*. The first implementation of Algol 68, named ALGOL 68R, was produced at the Royal Radar and Signals Establishment in the UK. ALGOL 68R demonstrated that Algol 68 was a viable language (not at the time a self-evident proposition). Although Algol 68 introduces many novel concepts of great theoretical interest and significance, its practical application has been almost nil.

Algorithm. A finite step-by-step procedure which is made up of mathematical and/or logical operations designed to solve a problem.

Algorithmic. Referring to a method cf problem-solving by a fixed procedure.

Algorithm Translation. A translation from one language to another by using an *algorithm*.



All-in-One Microcomputer

Alignment. Adjustment of tolerances within the mechanism of a device so that it will operate smoothly and correctly.

All-in-one Microcomputer. A computer system which consists of major systems components-a central processing unit, memory, input/output interfaces, circuitry, disk drives, cathode ray tube screen and keyboard-all within a signle housing. Contrast with incividual units combined to become a total system. *See module.*

Allocate. As a result of an action carried out by an operator, a *program instruction*, or automatically by an *executive programe*, to keep a peripheral *unit* or *memory* area under the control of a program. The *hardware* allocated may be *released* and made available to some other program, as compared to the situation where hardware has been *assigned* to a program for a whole *run.*

Allocation. Any planning needs, for allocation of the available resources to provide the best possible result, but before the resources have been allocated the meaning of'best passible result' must be established, and it will be essential to devise some criterion for judging the economic effect of each complete set of such allocations. In most business applications this criterion will be either total profit or total cost and the objective is to find the allocation which will maximize or minimize these respectively.

Methods of mathematical programming have been designed to solve such allocation problems.

Allocation, Dynamic Storage. *Dynamic allocation (of memory).*

All-Purpose Computor. Synonymous with *general purpose computer.*

Alphabet. An ordered character set. *See also* formal language.

Alphabetic. A code whose target alphabet contains only letters and/or strings of letters from the Roman alphabet.

Alphabetic String. A *string* in which the characters belong to a set of words which include an *alphabetic* set.

Alphageometric. In *videotex*, *picture description instructions* transmitted to a *terminal* which results in the graphic display of line drawings, colour-filling of polygons, approximately curved lines, etc., as well as text and character display. A standard for alphageometric display is the North American Presentation Level Protocol Syntax.

Alphamosaic. In *videotex* and *teletext*, it refers to a method of coding which allows signals transmitted to a *terminal* to be displayed in a mosaic of 2×3 rectangles. This method employs a simple and inexpensive decoder, but gets restricted to text and pictures which do not rely for their effect on curved or diagonal lines (both of which take on a staircase-like effect).

Alphanumeric. Consisting of letters, punctuation marks, numbers, and special characters.

Alphanumeric Character. Any of the 26 letters of the Roman alphabet, or any of the decimal digits, 0 through to 9.

Alphanumeric Code. A code whose target alphabet contains both letters and digits any/or strings thereof.

Alphaphotographic. In *videotex*, it refers to a method of coding which allows signals transmitted to a *terminal* to be displayed with photographic quality. The time spent for transmission and complexity of decoding restricts use of such coding.

Alteration Switch. A *switch* in which the path selected can be found out either manually or by *program*. Related to *indicator*.

Altos. A manufacturer and distributor of personal computers and business systems.

ALU. Arithmetic and Logic Unit (acronym, pronounce letters individually).

Alvey Programme. A collaborative programme of work on fifth-generation computing which was undertaken in the UK, with research results shared between participants. John Alvey chaired the working party which recommended the program.

Ambiguity Error. An error which occurs in the reading of a number when its digital representation is changing, For example, imprecise synchronization may, cause the number 399 to be read as 499 when it was in fact passing to 400.

American Standard Code for Information Interchange. *See ASCII*.

Amplitude. The magnitude of a variable, usually its maximum value whether or not it varies with time.

A/N. AlphaNumeric (acronym, pronounce letters individually).

Analog. A representation of numeric quantities which use continuously changing physical quantities as a reference. For example, sound is a wave, the level of which can be increased or decreased indefinitely.

Analog Adder. A device providing one output variable which is a weighted sum of two input variables.

Analog Channel. Channel, such as a *voice channel*, on which the data transmitted can be of any value between fixed limits which are defined by the channel.

Analog Computer. A computer that carries out computations (such as summation, multiplication, integration, and other operations) by manipulating continuous physical variables that are analogs of the quantities which are being subjected to computation. The most commonly used physical variable is voltage; time may also be used. Some analog computers are using mechanical components : the physical variables become, for example, angular, rotations and linear displacement.

Analog/Digital Converter. (A/D). Changing or converting analog (continuous) representations of some physical quantity such as music into a form suitable for digital (separate, distinct) computer processing; for example, into a binary system that is signified by an on or off electrical signal.

Analog Network. A circuit which represents physical variables in such a way that mathematical relationships can be depicted directly by examining measurable quantities continuously.

Analog representation. Refers to a representation of a variable by a physical quantity (such as voltage) whose magnitude is directly proportional to the variable.

Analyzer. A programe, such as a parser, which determines constituents in a string; the word is rarely used except in the combinations syntax analyzer and lexical analyzer.

Analysis. Refers to the study of a concept or *system* by breaking it down to the separate elements that form the whole structure so as to ascertain the functional relationship between these elements.

Analytical Function Generator. A *function generator* in which the *function* is a physical law. It is also known as natural law function generator, natural function generator.

AND. A Boolean operative (or connective) whose definition is that the output is 1 only when both inputs are 1. *See Boolean Algebra, truth table.*

AND Element. A *logic element* which operates with *binary digits* and provides one output signal from two input signals in accordance to the following rules. :

Input		*Output*
1	0	0
1	1	1
0	1	0
0	0	0

Thus a 1 digit is obtained as output only when two 1 digits are present as coincident input signals.

AND Gate. An electronic logic gate whose output is logic 1 (true) only when all (two or more) inputs are logic 1, otherwise it is logic 0 (false). It therefore implements the logical AND operation on its inputs and has the same truth table. The diagram shows the usual circuit symbol and the truth table of a two-input gate.

AND Operation. A logical operation which is applicable to two *operands* and will produce a result depending on the *bit patterns* of the operand and according to the following rules for each bit position :

Operands		*Result*
p	*q*	*r*
1	0	0
1	1	1
0	1	0
0	0	0

For example, operating upon the following 6-bit operands, we have,

$$\begin{array}{l} p=110110 \\ q=011010 \\ \hline r=010010 \end{array}$$

Annotation. Explanation added to a program to assist the reader. This may take the form of manuscript additions to the program listing, but more often takes the form of comments included in the program text.

Anomalistic Period. Refers to the interval of time between one passage of a satellite through its *apogge* and the next consecutive passage.

ANSI. American National Standards Institute (acronym, pronounce as one word). A committee that establishes standards for data processing and computers.

Anthropomorphic Image. A figure of speech to describe computers, computer procedures, and objects controlled by computers, as though the computer were a person.

Anti-Alising. On a graphics display, any technique that will diminish the error that appears as a function of the graphics hardware. An example of this error is the common "stepped" appearance that occurs when displaying a "straight" line on a raster display.

Anticoincidence Element. A *logic element* which operates with *binary digits* and provides one output signal from two input signal in accordance to the following rules :

Input		*Output*
1	0	1
1	1	0
0	1	1
0	0	0

Thus, a 1 digit is obtained as output only if two differing input signals are received.

APDOS. Apple DOS Operating System (acronym, pronounce as one word).

Aperture Plate. A small part of a piece of ferromagnetic material which constitutes a *magnetic cell.*

APL. A Programming Language (acronym, pronounce letters individually). A high level programming language which uses specially developed arithmetic operations It is considered a powerful language for algorithmic interactive programming and mathematical procedures, particularly those involving arrays.

Apple™. A manufacturer of computer systems and software.

Application. Refers to the particular kind of problem to which *data processing* techniques are applied.

Application Level. Refers to one of the seven layers of the *ISO Seven Layer Reference Model.* The application level forms the seventh layer. It provides direct support of application processes and *programs* of the end user and the management of the interconnexion of these programs to the communication entities.

Application Package. A *program* or *suite of programs* which is/are designed to carry out a specific type of work (*e.g.*, payroll, sales ledger, or storm sewer analysis).

Application Program. A *program* which forms part of a user's job and written by the user, as distinct from programs which form part of the general purpose *software* used to manage the operation of the total computer system.

Applications Software. Programs which are designed to handle specific type of information and achieve useful results or answer problems; for example, cost analysis, real estate management, word processing, etc. These are purchased or written by the user and stored on magnetic disks, tapes or other storage media. Documentation in the form of booklets or manuals is often supplied to instruct the user about the various operations involved. *Compare with systems software.*

Application System. A system which is designed to carry out a particular task.

Application Virtual Machine. Refers to a user's system operating in a computer system which is able to provide a *virtual machine environment.*

APSE. Acronym for Ada Programming Support Environment.

Arbitrarily Sectioned File. A *file* organized in a simple manner to allow for the addition and removal of *sections* automatically.

Arbitrary Fuction Generator. Synonymous with *general purpose function generator.*

Architectural Protection. The *hardware* and *software* facilities which are built into a computer system by the manufacturer for providing the security of processes and data handled within the system.

Architecture. Refers to the arrangement, design, and interconnection of components within the system. Also refers to the internal design of the microprocessor.

Archived File. A file that has been transferred to a lower level in the memory hierarchy, usually from magnetic disk to magnetic tape. The decision for this transfer to take place may be made as a conscious decision by the owner of the file, or it may arise from the operations of the appropriate resource management.

Archiving. Refers to the process of creating and maintaining *archived files* within a computer system—one of the functions which will be carried out by an *operating system* under the control of the operations staff.

Area. Any part of *memory* which is assigned to hold data of a specified type.

Area Search. Refers to the scanning of a large group of *records* for selecting those of a major category or class for further processing.

Argument. A variable within a function. The value of the function depends upon that of the variable; as each new argument value is substituted, the value of the function can be determined. The value of the argument can be passed from the main routine to a subroutine or function and then back again. It is possible to have more than one argument for a function or subroutine.

Arithmetic Address. An *address* which is obtained by carrying out an arithmetic operation on another address.

Arithmetic and Logic Unit. (ALU) An essential hardware component of a central processor that performs arithmetic (addition, subtraction, etc.) and logical (AND, OR, NOR, etc.) operations on data.

Arithmetic Expression. Refers to a meaningful combination of data numbers, names, and arithmetic operations.

Arithmetical Instruction. An *instruction* specifying an arithmetic operation upon data, *e.g.*, addition or multiplication.

Arithmetical Operation. An operation which is carried out by using the arithmetic instructions, *e.g.*, addition, subtraction, multiplication and division.

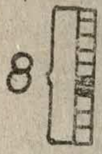
Arithmetic Register. A *register*, usually part of the *arithmetic unit*, constructed for containing the *operands* and results of arithmetic functions on data.

Arithmetic Shift. Movement of digits to left or right in computer memory, resulting in a multiplication or division of the number by 2.

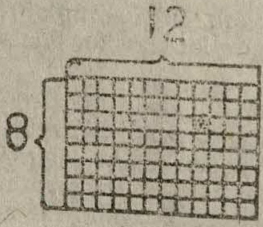
Arithmetic Unit. A unit within a computer which is carring out *arithmetical operations* on *operands*. It may also carry out arithmetic shifts, logical shift and other *logical operations* on data.

ARPANET. Advanced Research Projects Agency NET work (acronmy, pronounce as one word). A project which was developed by the U.S. Department of Defense in 1968 for implementing a nationwide computer network. Its goals are to permit computer resource sharing, develop highly reliable and economic digital communications, and enable access to unique and powerful facilities that become economically feasible when widely shared.

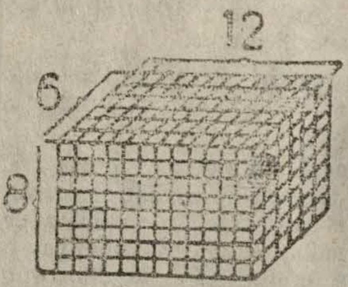
Array. A set of data which are usually ordered in such a way that each element of the set can be uniquely identified by the name of the set and the position of the element within the set. An array can be more than one-dimensional. For example, a two-dimensional array would have both horizontal and vertical directions.



ARRAY(8)
A.



ARRAY (8, 12)
B.



ARRAY (8, 12, 6)
C.

A. One Dimensipnal (Vertical only)

B. Two Dimensional (Horizontal and vertical)

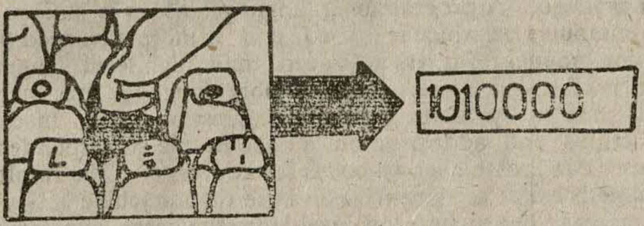
C. Three Dimensional (Depth, Width, Height)

Array Processor. A computer whose *architecture* permits it to process *arrays* of numbers by incorporating a set of processors which work simultaneously, each one working on one element of the array in parallel.

Artificial Intelligence. (AI). (1) The study of computer techniques that mimic certain functions typically associated with human intelligence; (2) The study of methods for developing machines capable of improving their own operations as a result of repeated experience with a given set of problems.

ASCII. American Standard Code for Informaion Interchange (acronym, pronounce as one word). Pronounced "askee," this standard for data transmission assigns individual 7-bit codes to represent each of a specific set of 128 numerals, letters and special controls.

ASCII Keyboard. A keyboard which is comprised of most or all characters of the ASCII character set. Most microcomputer keyboards use the ASCII character set. Each key, as it is depressed by the user, causes the appropriate ASCII code to be sent to a memory location in the computer. *See ASCII.*



ASCII keyboard

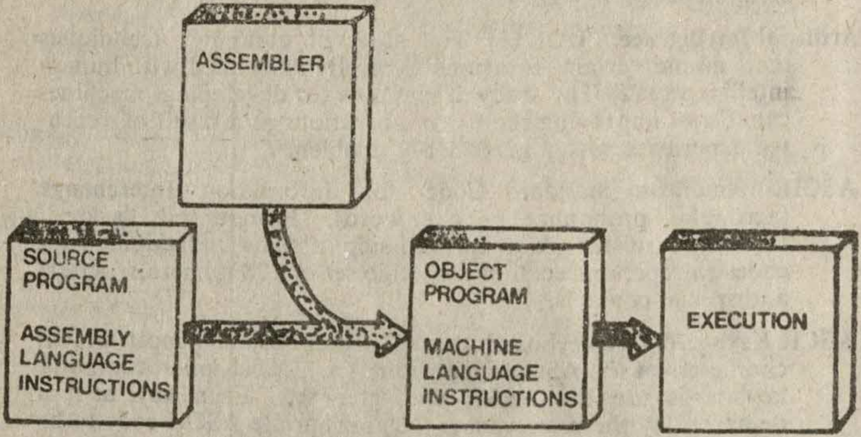
Aspect Ratio. In computer graphics, it may be defined as the ratio of the horizontal to vertical dimensions of a frame or image. The ability to maintain or control this ratio finds importance in the transfer and reproduction of an image on various types of display or in printed material.

ASR. Abbreviation of *automatic send-receive set.*

Assemble. To put a *program* through the process of *assembly* by using an *assembly program.*

Assembler. A computer program that is able to translate assembly language instructions (symbolic source code) into machine languags instructions (binary object code) so they can then be executed by the hardware on a step-by-step basis.

Assembly. Refers to the operation on a *symbolic language program* so as to produce a complete program in *machine language.* Basically, assembly comprises of (*a*) the translation of symbolic operation codes and *addresses* to machine language form, and (*b*) the grouping of the resultant machine language program from its constituent parts, *e.g.*, the inclusion of *library software*, consolidation of program *segments*, adjustments to *links*, etc.



Assembler

Assembly Language. A programming language, which is unique to each computer on which it is used, and is more advanced than machine language but less advanced than high level language in terms of ease of use. An assembly language has names which serve as symbolic codes to represent binary machine instructions and addresses on a one-to-one correspondence. The user can create his own codes for addresses. The resulting language is easier to remember and use than machine language. This machine-dependent, low-level language needs an assembler so as to translate the assembly language into machine language for execution.

```
MVI  A,58H
IN   03
ANI  01
```

Assembly Language

Assembly List. A list produced during *assembly* showing the details of the *symbolic language* and the corresponding details of the *machine language* form created by assembly. The comparison of the two languages is especially for any *debugging* which may be necessary.

Assembly Program. The *program* operating on a *symbolic language* program for producing a *machine language* program in the process of *assembly*. It is also known as assember, assembly routine.

Assembly Unit. Refers to a part of a *program* which could be incorporated into a larger program by the process of *assembly*.

Assign. To reserve a part of a computing system (usually a *peripheral unit*) for a specific purpose. Generally this reservation is permanent for the duration of a *program*.

Associative Memory. A high speed memory search which is based upon data content rather than addresses.

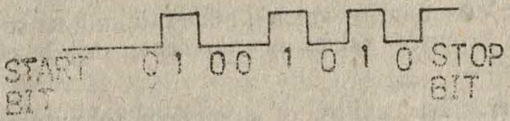
Associative Storage. Identification of storage by its content, not by its location or its name.

Associative Store. A *store* whose *locations* could be identified by their content rather than by their specific *address*.

Assumed Decimal Point. The position at which a decimal point would appear when decimal fractions are being printed or stored continuously with their *integral* part.

Asynchronous Computer. A computer operating on a method of *asynchronous working*.

Asynchronous Data Transmission. A means of transmitting data in which a timing synchronization between the sending and receiving devices is not needed in order to decode the characters. Instead, each character is surrounded by one or more start and stop bits in order to designate the beginning and ending points of the information. *See start bit and stop bit.*



0=ABSENCE OF VOLTAGE
1=VOLTAGE

Asynchronous Transmission

Asynchronous Working. Refers to a mode of operation for a machine in which the completion of one operation is able to initiate another.

Atari™. A manufacturer of personal computer systems and electronic games.

Attended Time. Time during which the computer is not under use either for serviceable operation (*up time*) or out of service for maintenance or engineering work.

Attentuate. Bringing about the reduction in amplitude of a signal.

Attenuation. Refers to the difference in amplitude between a signal at transmission and at reception. It is also known as loss.

Attribute. (1) A descriptive characteristic of the data, such as a category (example : freight number), its location, or length of word size; (2) Property of a computer device.

Audio Cassette Recording. A common serial access mass storage method which uses a standard home cassette tape player in combination with thin magnetic recording tapes stored in a plastic housing (cassette). To enable these standard home cassette players and tapes to be used with computers tonal frequencies are used to represent 0's and 1's instead of employing direct digital recording. *See digital recording, redundant recording.*

Audio Response Unit. The linking of pre-recorded responses held in a digitally coded form on a computer *storage device* by an audio response unit to a telephone network so as to give audible responses to inquiries.

Audit Trail. A method of following and recording data from the input stage, through any transitions, to the output stage. An audit trail can be used to trace an input or output error to its source, verify steps that have taken place during a certain process, or recover data lost during a hardware failure.

Augend. One of the *operands* which is used in addition. It is employed specifically to denote the operand which is replaced by the *sum* on completion of the operation.

Augment. To increase a quantity so as to bring it to a required value.

Augmenter. A quantity which is added to another so as to bring it to a required value; an augmenter may be either positive or negative.

Auto-Answer. The ability of a modem to automatically answer incoming telephone calls.

Autodial. To initiate a process which is activating an *autodialer*.

Autodialer. Refers to a device which, when activated by a short code or mnemonic key or, in *videotex*, by selecting a number from a *menu*, makes the dialling of a prerecorded telephone number and subsequent connexion to a computer.

Automatic Abstract. Key words which have been selected from a document and arranged in an order which could be understood by human beings.

Automatically Cleared Failure. A failure corrected by the system itself, *e.g.*, a *parity* failure overcome by retransmission of the data *blocks* concerned.

Automatically Corrected Error. An error detected and corrected by a system without involving an operator.

Automatic Carriage. A control device on typewriters and automatic *key punches.* It is able to control automatically the spacing, skipping, feeding and ejecting of paper, cards, preprinted forms, etc.

Automatic Check. Any facility, *software* or *hardware,* for automatically carrying out a check for the absence of specific errors.

Automatic Coding. Any technique which is using a computer to assist in the clerical work of programming.

Automatic Data Processing. Any form of processing which is carried out by automatic equipment.

Automatic Dictionary. In *information retrieval* systems, an automatic dictionary is substituting codes for words and phrases. In a language translating system it furnishes a word-for-word substitution from one language to another.

Automatic Error Correction. A technique using *error detecting codes* and *error correcting codes* and (usually) automatic retransmission. Errors in transmission could be automatically corrected.

Automatic Exchange. A transmission exchange in which communication between terminals could be carried out without intervention from operators.

Automatic Hardware Dump. A *dump* which arises from a system error. It provides information for diagnostic purposes, *e.g.*, concerning the internal state of the *instruction code* processes.

Automatic Interrupt. An interruption to a *program* which occurs due to a *hardware* device or *executive program.* It acts on some event occurring independently of the interrupted program. It is also known as automatic program interrupts.

Automatic Programming. 1. Synonymous with *automatic coding.* 2. The process of producing a *program* automatically without first having to describe the required result in a *procedural language.*

Automatic Punch. A *key punch* in which *punched cards* are passing through the machine automatically. Contrasted with *hand punch.* It is also known as automatic feed punch.

Automatic Restart. A *restart* which is effected automatically by an *operating system* without reference to the computer operators.

Automatic Send-Receive Set. A *teletypewriter* which receives as well as transmits.

Automatic Stop. A computer is programmed to stop if an *automatic check* detects an error; the halt is then called an automatic stop.

Automatic Tape Punch. A *tape punch* which is activated automatically by signals which are transmitted from a *central processor* or over some *data transmission* circuit.

Automatic Verifier. A *punched card* machine which is used for *card verifying*.

Automation. Means the automatic implementation of a process.

Automonitor. A *program* making a computer to keep a record of its own processing operations.

Autopolling. Means a party-line transmission circuit; each station is able to transmit in accordance to a predetermined arrangement.

Auxiliary Data. Data that is related to other data, but not part of it; for example, back-up data.

Auxiliary Equipment. *Data processing* equipment which is not under the direct control of a central processor.

Auxiliary Storage. (1) Same as mass storage; (2) One of several alternative types of storage media that is slower, but less expensive than mass storage.

Availability. A rating that indicates the amount of time that data processing equipment operates without error. It is expressed as a percent.

Available Point. A position on a *terminal screen* which is capable of being *addressed* and for which such characteristics as colour and intensity may be specified.

Available Time. 1. The time during which a computer is not under maintenance but is otherwise ready for use. 2. The amount of time a computer is made available to a particular user.

AVL Tree. A *binary* search tree arranged so that for each *node* the heights (levels)of the sub-trees are not different by more than one, and thereby producing a tree in which the heights are balanced. It is named after its original identifiers, Adelson, Velskin and Landis.

Axes. In a two-dimensional coordinate system, lines used as references for horizontal (x) and vertical (y) measurement in graphic representation. *See coordinate system.*

Axiomatic Semantics. Means a technique of describing, for a particular *program statement*, what should be true after the statement is *executed*; the description is an attempt to prove that a program is fault-free.

B

Back-End Processor. A *processor* which is used for carrying out a specific function (such as *data base management*) as part of a complete process.

Background Noise. Refers to the disturbance that interferes with operation of the microprocessor, usually extraneous information that must be taken out when the data is used. It is often introduced in the form of electrical current.

Backing Store. Refers to a store of larger *capacity* but slower *access time* than the *main memory* or *immediate access store* of a computer. It is also known as bulk store, auxiliary store, secondary store.

Backplane. Refers to the *board* by means of which a *central processor* communicates with its *peripheral units.*

Back Up 1. Duplication of a program or file onto a separate storage medium so that a copy will be preserved against possible loss or damage to the original. 2. The duplicate copy on a separate storage medium, serving as a guarantee in the event of loss or damage to the original.

Backup Storage. A section of *storage* which is not normally available to users but used within the computer system under the control of system management *software* for providing security copies of certain classes of file.

Backus Naur Form. An early, widely used formal notation for describing the *syntax* of a *programming language.* It was invented by John Backus and introduced for describing the syntax of *ALGOL 60* by Peter Naur, the editor of the ALGOL 60 Report.

Badge Reader. A *data collection* device (used, for example, in *in-plant* data communications systems) which is capable of reading data recorded as holes in prepunched cards, or plastic badges or more complex magnetic coding.

Band. 1. A group of magnetic *tracks* on a *magnetic drum* or *magnetic dish store.* 2. A range of frequencies between two defined limits.

Bandwidth. The range of frequencies which are passed by a transmission channel. For convenience, in voice and data transmission terminology, frequencies are usually classified as *narrow band* (up to 300 Hz), *voice band* (300—3000 Hz), and *broad band* or wide band (over 3000 Hz).

16430

Bar Code. An identification code appearing on retail product packaging and, less often, as the medium for programs and data storage. The code consists of light and dark lines which are used to represent data. The codes are scanned and decoded.

bar code

Bar Code Reader. A stylus-like device which is used to read optical bar codes printed on product labels of retail items. It is also called optical wand.

Bar Code Reader

Bar-Code Scanner. An *optical character reader* which is able to read automatically data from documents bearing characters formed with a special bar code. The characters are translated into *digital* signals which may enter directly into a *central processor* or get recorded on some data medium such as *magnetic disk.*

Barrel Printer. Refers to a *printer* in which all the characters for printing are kept round the surface of a cylinder (the barrel), the entire *character* set being placed round the cylinder at each *print position.*

Base. The number of unique, representative symbols used in a number system, beginning with zero. For example, base 2 has numbers 0 and 1. Also radix.

Base Address. 1. In *address modification*, it refers to an address to which a *modifier* has been added in order to obtain a variable *operand* address. 2. During the *assembly* or *loading* of a *program*, an address added to the address component of each *instruction* so as to obtain *absolute addresses.*

Baseband Signalling. Refers to the transmission of a digital signal without *modulation.* Only there is one signal at a time on a baseband channel.

Baseband Transmission. Refers to a means of using low frequency transmission of signals across coaxial cables for short distance local area network (LAN) transmission. *Contrast with broadband transmission. See network, local area.*

BASIC. Beginner's All-purpose Symbolic Instruction Code (acronym, pronounce as one word). A high level language which was developed at Dartmouth College. It is among the most popular languages used in programming for microcomputers. It is often found easier to learn than other programming languages because it allows more interaction between the user and the computer.

```
10 Rem Print Nos. From 1 to 100
20 For A 1 to 100
30 Print A
40 Next A
50 End
```

BASIC program

Basic Input/Output System. (BIOS). A part of the CP/M operating system which consists of drivers and other software that manage the peripheral devices. It usually needs to be modified each time a peripheral device gets changed.

Basic Language. Synonymous with *low level language. See BASIC.*

Basic Linkage. A *linkage* which serves as a standard for a given *routine*, or *program* and is used repeatedly following the same rules each time.

Batch. Refers to a collection of *transactions*, in the form, for example, of *source documents*, *punched cards* or a group of *records* on some *magnetic storage device*. Any group of records are processed as a single unit, *e.g.*, a *block*.

Batch Processing. Refers to a method by which many input items are accumulated over time and are grouped for processing during one machine run. It is generally associated with punch cards. Interactive communication between user and program is not possible.

Batch Total. A total obtained by adding certain *fields* of a series of *records*, *source documents*, or *punched cards*, so as to provide a check that all records are present at successive stages of processing. The total may be a meaningful accumulation of a quantity or value field, or it may be a *hash total*.

Baud. A unit which is used to measure the number of times per second that a *data transmission* channel changes state. It was named after Baudot, a pioneer of telegraphic communication, one baud is equivalent to one half-dot cycle per second in Morse code, or, in a binary channel, one baud is equal to one *bit* per second.

Baud Rate. Refers to a measure for the speed at which transmission is sent from one computer to a peripheral device, or from one device to another. In most systems, it refers to the number of bits of information transmitted per second (bps). Common baud rates are 110,300, 1200, and 9600. As a general guide, division by 10 usually yields an approximation of the number of English words transmitted per minute.

BCD. Binary Coded Decimal (acronym, pronounce letters individually).

BCPL. A *systems programming language* from which the language *C* was derived.

BCS. British Computer Society.

Bead. In a program it refers to a small *module* which carries out a specific function. Beads are usually written and tested individually and then strung together and tested in groups sometimes called *threads.* In this way programs can be written and tested in a modular way and this offers a sound method for controlling the development of complex programs.

Beat. Refers to a unit of time which is related to the execution of an instruction in the *program controller* of a *central processor*.

Benchmark. A measured point of reference from which comparisons of any kind may be made. It is often used in evaluating hardware and software or in comparing computers against one another.

Benchmark Problem. A particular calculation which is used to measure the performance of different machines or *programs. See benchmark.*

Bi-Directional Printing. A type of printer head motion that premits the head to alternate a left-to-right motion with a right-to-left motion on each successive line of point. It is a faster technique than some printers which, like conventional typewriters, always return to the left margin to begin a new line.

Billi. A prefix denoting one thousand million or 10^9, synonymous with *giga.*

Binary Arithmetic Operation. Any *arithmetical operation* in which the *operands* are *binary numbers.*

Binary Boolean Operation. Synonymous with *dyadic Boolean operation.*

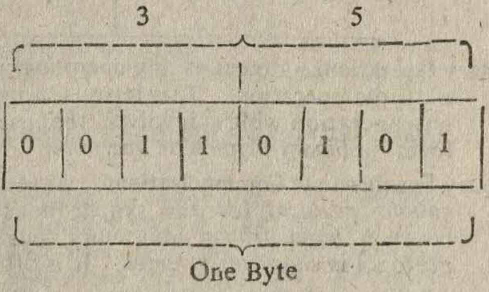
Binary Cell. A storage element which is able to represent one *binary digit.*

Binary Code. Refers to a *code* in which *characters* have been represented by groups of *binary digits.* For example, a common coding system uses 6-bit groups to represent different characters and allows for up to 64 separate characters to be represented, each by a unique *bit pattern.*

Binary-Coded Character. A *character* which is represented by a *binary code.*

Binary Coded Decimal Notation. (BCD). A method of using groups of four binary digits to separately code each individual digit of a decimal number. These binary digits are in reality ASCII code for the decimal number, but since the three digits at the extreme left of the 7-bit ASCII code are the same for representations of 0_{10} through 9_{10}, these three digits have been dropped off in use, which leaves a four-digit code. *See ASCII.*

Unused Digits	Binary Repres.	BCD
011	0000	0
011	0001	1
011	0010	2
011	0011	3
011	0100	4
011	0101	5
011	0110	6
011	0111	7
011	1000	8
011	1001	9



Binary Coded Decimals

Binary Coded Digit. Any numeral which is represented by a coded group of *binary digits.* For instance, the use of four *bits* to represent a *decimal digit*, or the use of three bits to represent a digit in the *octal* scale of notation.

Binary Counter. A *counter* which is able to accumulate numbers recorded in the *binary* scale of notation.

Binary Half Adder. A *half adder* which is operating with digits representing *binary* signals and is capable of receiving two inputs and of delivering two outputs.

Binary Incremental Representation. Refers to a form of *incremental representation* in which the value of an increment has been represented by one *binary digit*, after being rounded to either plus one or minus one.

Input		Output	
Augend	Addend	Sum	Carry
1	0	1	0
1	1	0	1
0	1	1	0
0	0	0	0

Binary Operation. Refers to any *operation* using two *operands, i.e.*, a dyadic operation. This term is, however, also used to mean any operation which involves the use of operands in binary form—a *binary arithmetic operation.*

Binary Synchronous Communications. Refers to IBM *data communications protocol* for the synchronous transmission of data between *main frame* computers and *remote terminals.* The protocol is *character-oriented.* It is often known as bisync.

Binary System. A system of numbers having two as its base and uses only combinations of the digits zero (0) and one (1). This mathematical system is based on the addition of progressive powers of two. It works conveniently in computers because its two states, zero and one, can be signified by the two states in computer circuitry—on and off—indicated by the presence or absence of voltage.

Bionics. Refers to the study of the functions and characteristics of living systems in relation to the development of *hardware* designed to operate in a similar manner.

BIOS. Basic Input/Output System (acronym, pronounce as one word).

Bipolar. An input signal is said to be bipolar if different logical states have been represented by signals of different electrical voltage polarity.

Biquinary Code. Refers to the representation of a number (n) by a pair of numbers (x, y) where n=x+y and x=0 or 5, y=0, 1, 2, 3 or 4. The pair may be represented in a *binary* code by employing the following table :

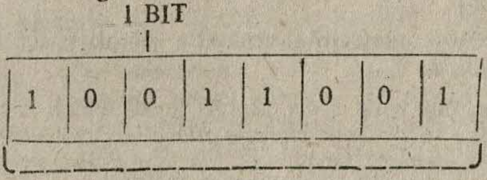
Decimal	Biquinary	Binary Representation
0	0+0	0000
1	0+1	0001
2	0+2	0010
3	0+3	0011
4	0+4	0100
5	5+0	1000
6	5+1	1001
7	5+2	1010
8	5+3	1011
9	5+4	1100

Bistable. Refers to a circuit that is able to assume one of two states; application of an energy pulse will bring about a reversal, so that if the current state is 1, it becomes 0, and vice versa. It is also called flip-flop.

Bistable Circuit. A circuit which can be triggered to adopt one of two stable states. It is also known as binary pair, bistable trigger circuit, trigger pair.

Bistable Magnetic Core. A *magnetic core* adopting one of two states of magnetization.

Bit. Binary digit (acronym, pronounce as one word). (1) The most basic element of a binary number, which consists either of a 1 or a 0. Grouped bits are used as codes for representing different kinds of information to the computer. Common group sizes have been 4 and 8 bits, called words. *See word size, byte nibble* ; (2) The most elementary data representation in the computer ; each bit takes up one unit of storage space. Usually, the presence of voltage represent a 1, while the absence of voltage indicates 0.



Bit

Bit Density. The number of bits which are stored per unit length or area of a magnetic recording medium. The figure is usually calculated as the maximum density achieved, *i.e.*, it does not consider the unrecorded areas between blocks, tracks, sectors, etc.

Bit Handling. The faculty provided in some programming languages for manipulating the individual bits of a byte or word. Operators provided usually include bitwise "and" and "or" between two bytes (or words) bitwise "not" (inversion) of a single byte (or word), and circular shifts. Many of the programming operations traditionally regarded as bit handling can be achieved in Pascal by use of sets.

Bit Location. An element of *main memory* which is capable of storing one *bit*.

Bit Mapping. A technique which is used in *graphic* display in which the information displayed on a *screen* corresponds, *pixel* by pixel, with *bits* held in *main memory*.

Bit Matrix. A two-dimensional array in which each element is equal to 0 or to 1. *Compare* Boolean matrix.

Bit Pattern. A sequence of *bits*. Bit patterns may be used for representing *characters* in a *binary code*.

Bit Position. Refers to the *digit position* of a *bit* in a *word*, referenced as the first, second, third, etc., position from the least significant bit.

Bit Rate. Relating to the speed of a device, *e.g.*, the speed with which *binary digit* could be transferred over a communications channel. It may be measured in *bits per seconds* or *bauds*.

Bit Slice Microprocessor. A *microprocessor* which uses a computer *architecture* that employs a number of high performance processing units chained together. Each of these units (slices) denotes a width (*e.g.*, 2, 4 or 8 *bits*) of an *arithmetic and logic unit*. These are *microprogrammed* to form a processor of any desired *word* length out of standard units.

Bit Track. Refers to a physical track on a *disk* or a *drum*, along which a *read/write head* reads or records data serially as successive *binary digits*.

Blank. Empty, *i.e.*, not containing meaningful data. In a memory, blank cells may contain a particular bit pattern that has no assigned value.

Blank Character. A character that creates a blank space when displayed or printed.

Blast. 1. Synonymous with *blow*. 2. A term which is sometimes used in relation to *dynamic storage allocation*; to *release* external or internal *memory* areas so that they are available for re-allocation to other *programs*.

Block. A generic term for any kind of grouped data (bits, bytes, words, records) handled as a single unit. It is often associated with a contiguous group of records on a disk, and is accessed as a unit. *See record.*

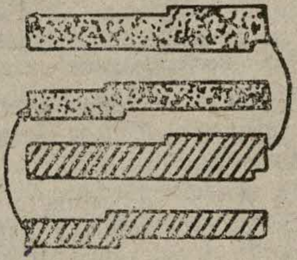
Block Diagram. The diagrammatic representation of any system (*e.g.*, a computer *program*, an electrical circuit) in which logical units of the system have been represented by labelled rectangles or *boxes* and the relationship between units is depicted by means of connecting lines, article on *Flowcharts*.

Blocking. Refers to the grouping of individual *records* into *blocks*, usually to achieve a greater efficiency for *input/output* operations, by decreasing number of *read* or *write* cperations required. It is also known as batching.

Block Length. The size of a *block*, measured in the number of *characters*, *words* or *records* it is having.

Block Mark. A special character which is used to indicate the end of a block. It is used particularly for systems in which *variable block* are used.

Block Move. Moving a block of data or text as a single unit. This process appears on the monitor.



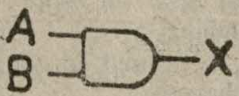
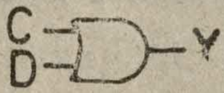
Block Move

Block Sort. Refers to a sorting method that sorts the data into smaller groups for further sorting.

Block Transfer. Refers to the movement of an entire block of data, either from one memory location to another, or between a memory location and an external device.

Board. Refers to the rigid rectangular sheet of insulating material on which an *integrated circuit* is mounted. Boards themselves are positioned on a *chassis, printed circuit board.*

Boolean Algebra. An algebraic system relating logical functions instead of numbers. Boolean operatives such as "AND," "OR," and "NOR" are used for composing one expression to another. This symbolic representation of logical relationships, using Boolean operatives is known as algebra because it involves various rules used in algebra. In terms of computer technology, logical operations using Boolean Algebra give rise to the conditions (or decisions) that are used as input into branching operations in computer programs. The output reveals the next step to be taken.

Logical Operator	Schematic Symbol	Spoken Logical Statement	Boolean Equation	Truth Table
And		X is 1 If A & B are 1 Other-wise X is 0	X=A and B X=AB	A B X 0 0 0 1 0 0 0 1 0 1 1 1
OR		Y is 1 If C OR D Are 1 Otherwise Y is 0	Y=C or D	A B Y 0 0 0 1 0 1 0 1 1 1 1 1

Boolean Algebra

Boolean Connective. A *connective* which is usad to connect the *operands* in a statement of a *Boolean operation* which indicates the type of operation concerned.

Boolean Operation Table. A table indicating for a particular *Boolean operation*, the values that will result for particular combinations of *bits* in the *operands*. If the values are interpreted as true or false, it is known as a *truth table*. *Boolean algebra*.

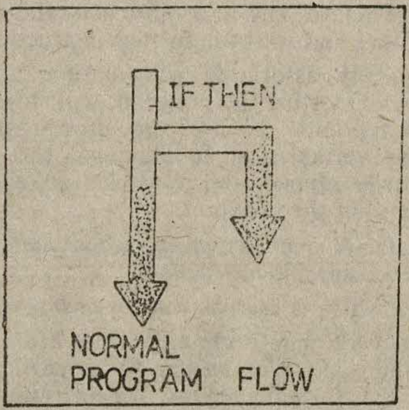
Booting. See bootstrapping.

Bootstrapping. Refers to the process of initializing the computer for use by automatically clearing memory and loading the first few instructions, which call other instructions, which call other instructions, etc. This is all the computer needs so as to get itself started. The term is based on the term "to pull oneself up by the bootstraps." Also known as booting.

Borrow. A carry signal arising in *subtraction* when the difference between digits is less than zero.

Box. A *flowchart symbol* which represents a logical unit of a system or *program*.

Branch. An instruction of a program causing transfer from the current sequence of instructions to a different sequence, if certain conditions are satisfied. If the condition is not satisfied, the transfer will occur to the next instruction in sequence. *See conditional branch, unconditional branch.*

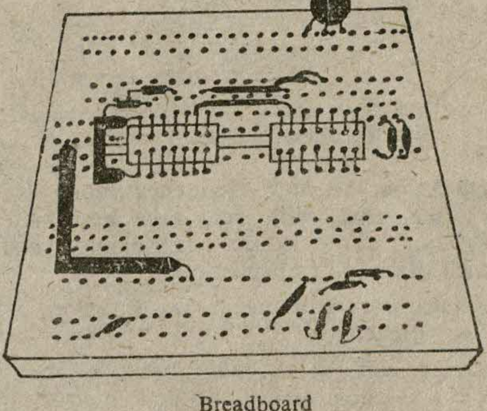


Branch

Branch Instruction. A *program* is normally carried out by obeying a series of *instructions* which can be stored in successive *locations* of *memory*. This sequence of operation can be changed by special *branch* instructions which can direct the *program controller* to undertake a specific series of instructions.

Branchpoint. The point in a *program* where a *branch* takes place.

Breadboard. Refers to an experimental model of a circuit which is usually roughly conceived. It fastens temporarily to a board and can be used as a protoype in planning, design and feasibility studies. Blank circuit boards are available for experimental circuit-design purposes.



Breadboard

Break. An interruption of a transmission.

Breakdown. A failure of *hardware* or *software* which needs the attention of an engineer or technical support specialist.

Break Key. A keyboard key that instructs the computer to stop what it is doing and wait for further instructions.

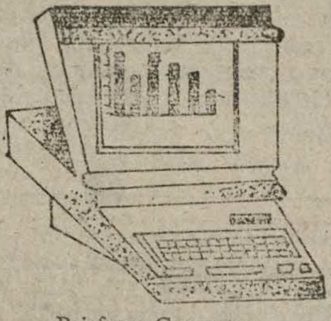
Breakpoint. Typically associated with on-line debugging. A programmer, while testing the program, will stop the execution at ~~various~~ "breakpoints" so as to monitor progress. In addition to examining variables at breakpoints, the programmer also can temporarily change the variables so as to test different conditions within the program.

Breakpoint Symbol. A symbol used in *programming* for indicating a *breakpoint* at a specific *instruction.*

Bric. A *cartridge* which is used as *main memory.*

Bridgeware. *Hardware* or *software* aids which are used to transcribe *programs* and *data files* written for a particular type of computer into the format essential for operation on another type of computer.

Briefcase Computer. A category of computers which are characterized by their briefcase-like size and shape ; and made possible in part by the use of a flat panel liquid crystal display (LCD) rather than a cathode ray tube (CRT) display. Briefcase computers are generally larger than hand-held computers, but are smaller than "portable" computers that have a CRT screen.



Briefcase Computer

Broadband Transmission. A high frequency mode of transmission which is often used with local area networks. It may use coaxial cable and allow longer transmission distance than is possible with baseband transmission.

Broadcast. Refers to the simultaneous transmission of information to a number of terminals.

Brush. An electrical conductor which is used in some systems as a means of sensing the presence of a hole in a *punched card.*

BSC. Abbreviation of *binary synchronous communications.*

Bubble Memory. Refers to a method of representing *data* in *memory* as magnetic bubble which could be magnetized in the opposite direction from that of the rest of the medium.

Bubble Sort. A program that can be written by the user, or purchased, to sort many types of data, The sorting is under taken by exchange of pairs of numbers. It is often considered relatively fast and easy to program, but it is slow in execution.

Bucket. In *direct access storage* a bucket represents a unit of storage as different from the data contained in the unit.

Budgetary Control. Budgetary control is a system which is used by management in which targets (budgets) are set and actual performance compared with them. The purpose is to as certain where, how and why actual results get diverged from the budget and what action is essential to achieve the budget. Computers are used for recording and reporting the information needed in a budgetary control system (for example, on *spreadsheets* on personal computers).

Budgeting. In computing, it refers to the process of allocating resources to a particular development activity so as to constrain the resources which are utilized for the project.

Buffer. (1) Any device that is able to store information temporarily during data transfer, internally and externally, to compensate for differences in rates of data flow. For example, without a buffer in a CRT terminal, characters transferred to the terminal from the CPU that would not immediately fit would be lost; (2) An assigned part of memory which is used as a holding area, or a feature of a peripheral device such as a printer.

Buffer Amplifier. An amplifier which is used to isolate a signal source (*e.g.*, an oscillator) from another circuit being driven by that source. This disallows the driving circuit from being affected by the characteristics of the driven circuit.

Buffered Computer. A computer in which *buffer stores* are provided for matching the speed of the *peripheral units* to the higher speed of a *central processor.*

Buffered Input/Output. Refers to the use of *input/output buffers* for increasing efficiency when data gets transmitted to and from a *central processor.*

Buffer Store. Generally used as a means of temporarily storing data if information is being transmitted from one unit to another.

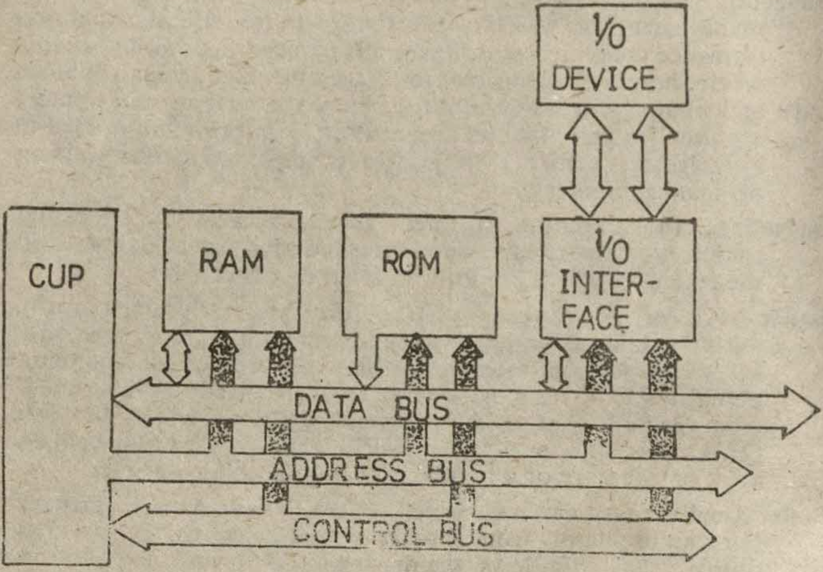
Bug. A mistake, malfunction or defect in any part of the computer, the program or the system.

Bulletin Board. *See electronic bulletin board.*

Burn-in. Refers to operation of a new device off the assembly line for a specified initial time period, often at the limits of operating temperature, so as to pinpoint component failures due to defective manufacture. Component failures are most likely to take place during this initial time period.

Burster. A device which is used *off-line* in a computer system for separating individual forms in a set of continuous *stationery* produced as output from a *printer*.

Bus. Signal paths, or lines which are responsible for moving bits of information from one place to another In microcomputers, the three buses used are : the *address bus*, which sends locations of data back and forth; the *control bus*, which transmits signals that regulate data flow; and the *data bus*, which carries actual program data.



Buses

Bus Driver. *See driver.*

Business Graphics. *See graphics, business.*

Byte. A group of 8 bits which are treated as a unit and often used to represent one character. It is a convenient word length because it is able to express the entire ASCII character set. *See ASCII.*

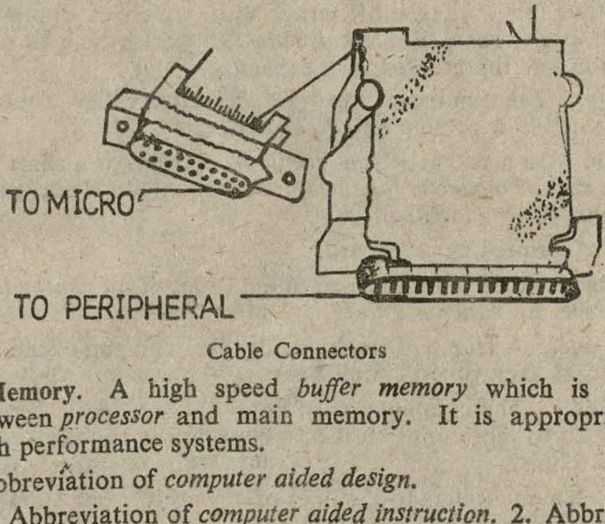
Byte Mode. Refers to a mode of data transfer between a *central processor* and a *peripheral unit* in which the unit of transfer is a single *byte* at a time.

Byte Track. Refers to a number of *tracks* present on the surface of a *disk* or *drum*, along which *read/write heads* move in parallel to read or record data which represents a unit of information (*e.g., byte*).

C

C. A high level programming language which was developed at Bell Laboratories for writing systems software. The popular Unix operating system, also by Bell Labs, was written using the C language. C offers many features that are useful when programming difficult jobs. It helps reduce program length and increases efficiency, and was designed for use by professional programmers.

Cable Connector. Male/female plugs which are necessary for connecting industry-standard cables such as the RS-232.



Cable Connectors

Cache Memory. A high speed *buffer memory* which is situated between *processor* and main memory. It is appropriate for high performance systems.

CAD. Abbreviation of *computer aided design.*

CAI. 1. Abbreviation of *computer aided instruction.* 2. Abbreviation for *computer assisted instruction.*

Calculating Punch. A *calculator* which is equipped with a *card reader* and a *card punch.*

Calculator. A data processing device that can carry out logic and arithmetic operations, but which has limited programming capability for the user.

Call. A transfer of program control to a subroutine; the type of subroutine may vary according to the specific needs of the program.

Calling Sequence. The set of instructions that serves as a linkage going to and returning from program subroutines.

Call Instruction. A type of instruction which, after diverting execution to a new sequence of instructions, allows a return to the program's original sequence.

CAM. Content Addressed Memory (acronym, pronounce as one word). The capability to retrieve data identified by content rather than by a numbered location or an identifiable data pattern.

Cancel. To stop or abort a command or procedure in progress or pending execution.

CANCL. A status word which indicates a deletion of information by a remote computing system.

Canned Software. Packaged software which is designed for a specific application, but which is general enough to cater the needs of many users interested in that application.

Capacitor Store. A type of storage unit which is commonly used in early *punched card calculators*, in which each *bit* of information was represented by a capacitor.

Capacity. The number of *words* or *characters* which could be contained in a particular *storage device.*

Capstan. On a magnetic *tape transport*, capstan is a shaft on which a reel of *magnetic tape* has been mounted. It drives the tape past the *read/write head.*

Card. A printed circuit board.

Card Back. Refers to the unprinted side of a *punched card*; the obverse of the *card face.*

Card Cage. A frame of rack inside the computer housing which holds the printed circuit boards.

Card Code. The combination of holes in a *punched card* which is used to represent letters of the alphabet, numerals or special symbols.

Card Column. Refers to the lines of a *punched card* parallel to the short edge of the card.

Card Face. The printed side of a *punched card.*

Card Feed. Means a mechanism which is able to move *punched cards* one at a time into the sensing, rearing or punching mechanism of a machine.

Card Field. A group of consecutive *card columns* in a *punched card* having a unit of information.

Card Hopper. A device by which it is possible to hold *punched cards* and make them available as required to a *card feed* mechanism, *e.g.*, on a *card reader* or *card punch.* It is also known as input magazine.

Card Image. Refers to an exact representation in *store* of each character in a *punched card.*

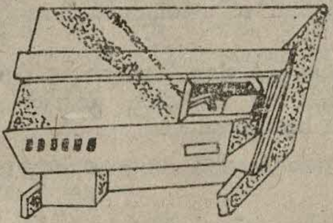
Card Leading Edge. Refers to the edge of a *punched card* which led when the card was transported along a *card track.*

Card Loader. A routine which is used to *load* a *program* from *punched cards* into *store*

Card Punch. A machine which is able to cause holes to be punched in *punched cards*, thus permitting data to be stored and later conveyed to other machines which could read or sense the holes.

Card Punching. The punching of holes into *punched cards.* The punching allowed the data to be stored and later conveyed to other machines which could read or sense the holes.

Card Reader. A device that can transcribe punched-hole data from paper cards into electrical impulses for input into computer memory.



Card Reader

Card Reproducer. A machine which is able to read a *punched card* and punched a copy of the card.

Card Row. Refers to a line of *punching positions* on a *punched card* which are parallel to the long edge of the card.

Card Stacker. Refers to an *output device* which is used for holding *punched cards* (stacking them in a *pack*) after they had passed through, for example, a *card reader* or *card punch.*

Card Systems. Computer systems having no input *peripheral unit* other than a *card* reader, and no output peripheral unit other than a *card punch* and a *printer*. Such systems lack a *backing store.*

Card-to-magnetic-tape Convertor. A device which is able to read batches of data from *punched cards* and wrote them as logical *records* on to *magnetic tape* ready for subsequent processing. This type of equipment was designed for allowing data *input* and *validation* to be undertaken without monopolizing the *central processor* of the main configuration.

Card-to-tape Converter. A device which is used for converting from one unit of storage (*punched cards*) to another (*paper tape*). The data contained in the punched cards was read, converted into the new character code and punched into paper tape.

Card Track. That part of a *punched card* machine which is able to transport cards through the various *reading stations* and/or *punching stations*, from the input *hopper* to the *stacker*. It is also known as card bed.

Card Verifier. A *punched card* machine which is used for *card verifying after* data had been punched into cards.

Card Verifying. The process of checking that the data encoded on a punched card or magnetic card has the intended relationship to the original data. It is being made obsolete by systems in which the data is stored and verified before being encoded onto a card. *See also* verification.

Card Wreck. A fault condition that takes place if one or more *punched cards* become jammed along the *card track* of a punched card machine. It is also known as card jam.

Carriage Return. A non-printable character that: (1) causes the cursor of a cathode ray tube screen or the head of a printer to return to the beginning of the line; (2) is used as a delimeter, signifying the end of a command line, typically referred to as <CR>.

Carry-Complete Signal. A signal which is developed by an *adder* to indicate that all arithmetic carries relevant to particular operation have been produced.

Carry Time. A system needed to add a *carry* into the next higher digit position.

Cartridge. Refers to a container which is used to protect and facilitate the use of various computerrelated media such as magnetic tape, magnetic disk, or printer ink ribbon. It is usually designed so that the medium remains permanently within the cartridge or at least attached to it, and the medium itself is not touched by an operator.

Cartridge Drive. Either a tape transport for handling cartridge tape, or a disk drive for handling disk cartridges.

Cartridge Tape. Tape carried in a magnetic tape cartidge. The term is generally employed in reference to the 3M-type cartridge.

Cascade Control. Refers to a system of automatic control in which control units have been organized in sequence so that each unit is able to control its successor and is in turn controlled by its predecessor.

Cascaded Carry. A *carry* into a digit position which results in a carry out of the same digit position ; uses the normal adding circuit, unlike a *high-speed carry*.

Cassette. A container which is similar to a cartridge, but conventionally the two terms are applicable to different types of device. A cassette is usually interchangeable with an ordinary domestic audio cassette. *See* magnetic tape cartridge.

Cassette Drive. A tape transport which is used for handling magnetic tape contained in cassettes., *See* magnetic tape cartridge.

Cassette Interface. The special circuity which is used to control data transfer between a cassette tape recorder and a computer.

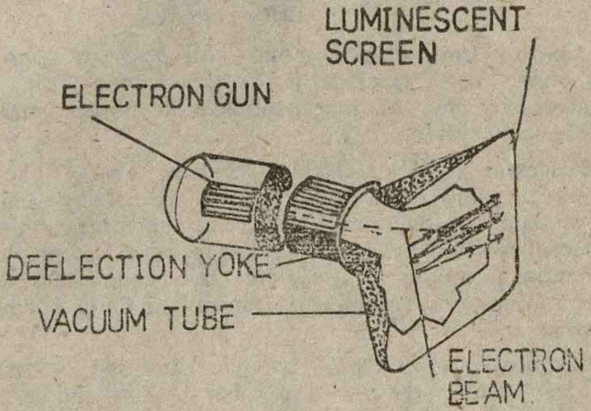
Cassette Recording, Audio. A recording of analog signals which are representing continuous tones.

Catalog. (1) An ordered set of items, such as files or programs, arranged in an easy-to-reference structure; (2) To index a set of items, such as a list of files; (3) Same as directory.

Category. Refers to a group of *direct access disks* or *volumes* having a given set of information. For example, *files* used for *program* development work may be kept in a particular category.

Cathode Follower. A form of *buffer amplifier* using a thermionic value. In this the potential of the cathode follows that of the grid.

Cathode Ray Tube. (CRT). A technology which is similar to the television set but used for display purposes. The term CRT is usually applicable to the computer terminal, which includes the screen and keyboard. The screen consists of a vacuum tube having an electron gun that generates and focuses a beam of electrons to a small cross-sectional area on a luminescent screen. The position of the beam can be varied and its intensity adjusted for producing a visible pattern on the screen. *See raster scan, RGB monitor.*



Cathode Ray Tube

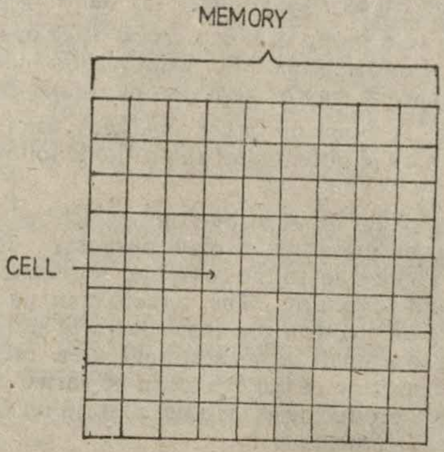
Cathode Ray Tube Visual Display Unit. A *visual display unit* in which a *cathode ray tube* is used as the medium for the output of data.

CBASIC. (Acronym, pronounce first letter individually, rest as one word). A compiler version of the BASIC programming language which was designed for use with the 8080 and Z80 family of microprocessors.

CBBS. Computerized Bulletin Board Service (acronym, pronounce letters individually). *See electronic bulletin board.*

CD Rom. A *compact disk read only memory* : a storage device which uses *optical laser storage* techniques.

Cell. Refers to a location in memory for one unit of information, typically one character or one byte. *See byte.*



Cell

Central Control Unit. Synonymous with *program controller*, but sometimes used specifically for denoting a unit which has control over one, or more, subordinate *control units* operating in the same system.

Central Processor (CPU; Central Processing Unit). The principal operating part of a computer. It is usually defined as the arithmetic and logic unit (ALU) and the control unit (CU) and sometimes (but not always) the primary memory. As the functions in a computing system have become more distributed and autonomous, the specification of the CPU has become less significant.

Central Terminal. A *hardware* unit coordinating communications between a computer and a number of outlying terminals. It may be able to receive messages at random from the terminals, store them until they can be handled by the *central processor* and then return them to the terminal concerned.

Chad. The piece of paper which is removed when a code hole is punched in *paper tape* or a *punched card.*

Chadded Tape. Refers to *paper tape* which is punched in such a way that the *chads* are only partially removed and remain attached to the tape.

Chadless Tape. *Paper tape* in which the *chads* are completely removed.

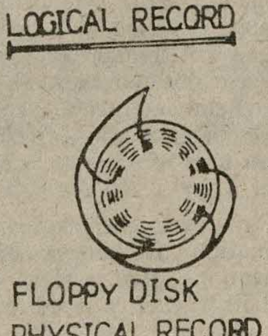
Chain Code 1. A method of describing contours by a succession (chain) of symbols representing a discrete set of directional vectors. It is used in computer graphics and pattern recognition for description of line drawings (including characters). **2.** *Another name* (*chiefly UK*) *for* simplex code.

Chained Files. Data files that consist of a data block series in which the blocks are chained together using forward and backward pointers.

Chained List. Refers to a list in which each item points to the next item; the order of retrieval need not have any relation to the storage order.

Chained Record. A *file* of *records* in which the records have been arranged in a random manner in *memory* or *backing store* but are linked by means of a control *field* in each record which provides the *address* of the next record in the series. The first such record is termed as the *home record*.

Chained Sector. Refers to a storage method that allows one logical unit to be spread across different areas on disk, as opposed to being stored as one contiguous area.



Chained Sectors

Chaining. (1) Refers to the ability of a program to call in another program—or section of a program—to be executed once its own execution has been completed. This permits a program to be larger than would otherwise fit into memory at one time. Sometimes referred to as an overlay; (2) Also, refers to a storage and retrieval system for records that does not require all records to be contiguous.

Chaining Search. Refers to a search method in which, by using a specific identifier, each item that is found contains information that leads to the next item in the chain, until either the end of the chain is reached or the desired record is found.

Chain Printer. A high-speed *printer* in which the type has been carried past the paper by the links of a continuous chain.

Change of Control. Refers to a logical break in the sequence of *records* being processed which initiated some predetermined action (*e.g.*, the printing of *control totals*) before the next group of records has been processed.

Change Record. A *record* whose function is to change information in a corresponding *master record.* It is also known as amendment record, transaction record.

Channel. 1. Refers to a path along which information flows. If all elements of a digit are sent in parallel, a channel is made up of parallel paths. 2. A *paper tape* channel is a longitudinal row in which code holes may be punched in paper tape. 3. The part of a *store* which is accessible to a reading station.

Channel Adapter. Refers to a device that enables communication between data channels on different hardware.

Channel-to-Channel Connexion. Refers to the transfer of data between computers by using connecting appropriate *channels* from each system.

Character. Refers to one of a set of symbols such as letters, digits, or punctuation marks, which can express information when collectively arranged. Although these symbols are intelligible to humans, they are not understood by computers. For this reason, standardized character codes consisting of groups of bits have been developed for allowing characters to be machine processed. In most microprocessors, a character may be represented by 8 bits, or 1 byte. *See bit, byte.*

Character Code. Refers to a code, such as ASCII (American Standard Code for Information Exchange) or ISO (International Standards Organization), that assigns a special standardized group of binary digits to each printed character. *See ASCII, ISO.*

Character Density. Refers to the number of characters that can be stored per unit of length, *e.g.*, on *magnetic tape.* (*packing density*).

Characteristic. Refers to an alternative for *exponent*, when reference is made to *floating point representation.* The characteristic is the signed integer which serves to indicate the position of the *radix point* for the *fixed point part* of the number.

Character Modifier. A constant which is used in *address modification* to reference the *location* of a specific character.

Character Oriented. Referring to a computer in which individual character *locations* could be *addressed* rather than *words.* Each *operand* in *memory* is addressed by specifying the first and last character location, thus allowing *variable length* operands to be used

Character Pitch. In a line of text, the number of characters per inch.

Characters per inch=10

Characters per inch=12

Characters per inch=15

/——————/——————/——————/

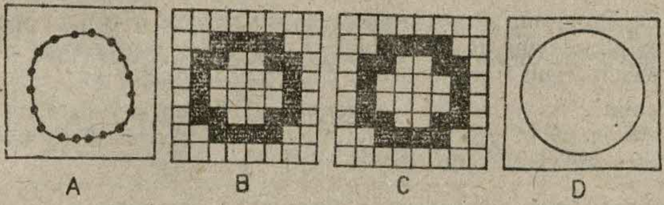
1″ 2″ 3″

Character Pitch

Character Pitch Display. Refers to the ability of a printer to output characters in a number of different pitches (sizes) requested by the software.

Character Reader. A device which is able to convert characters input in a form legible to human beings into machine language.

Character Recognition. A process which allows a computer to recognize a printed or written symbol or character. The process involves (a) scanning the symbol; (b) encoding the symbol into a square grid format; (c) comparing the encoded symbol against a library of stored symbol templates until the appropriate match is found; and (d) substituting the standardized symbol for the recognized symbol.



Character Recognition

Character Repertoire. The range of *characters* which are available in a particular code, or for example, on each *print member* of a *line printer*.

Character Set. Refers to the combined group of characters which are available for input or output of data on a particular computer or peripheral. Some computers allow for alternate character sets such as foreign language or graphic symbols; others provide for user modification of character sets.

Character Size Control Refers to the ability to view a full page of data at a regular character size or one-half page at double size.

Charge Coupled Device. A *semiconductor* device used for storing data which is suitable for applications where *memory* is *accessed serially.*

Chart. Any diagram which is used as an aid in analysing or solving a problem when developing a system or *program*, or when documenting any system or procedure.

Chassis. Refers to the metal base *e.g.*, in a *microcomputer*, on which are mounted the sockets and wiring. It is also equipped with a structure which is designed to accept a *backplane* and *printed circuit board.*

Check. Any operation which is carried out to test the validity or accuracy of an *operand* or result ; e g , to test for the presence or absence of certain specified conditions.

Check Character. A *character* which forms one of a group of characters, the value of which depends on the other members of the group. Its main function is to act as a check on the other characters when data is stored or transferred, and it is redundant in so far as its information content is concerned.

Check Digits. In most *data processing* applications it becomes necessary to ascribe numbers, or codes, to people or objects so as to process data about them. People are assigned staff numbers; spare parts are assigned numbers; almost everything, for data processing purposes, is assigned number.

Check Indicator. Refers to method of showing that a check has failed. The indicator may be a *hardware* indicator, causing a *console* display or an internal *switch* to be set which may be tested by *program*, or it may be a programmed indicator making an error message to be printed.

Checking Program. A *program* diagnosing errors in other programs by identifying, in the format of the various *instructions*, mistakes which result from incorrect coding or mispunching.

Checkpoint. A point in a *program* at which details concerning the state of the program have been recorded to assist in *recovery* should it be subsequently necessary.

Checkpoint Dump. Refers to the process of recording details in the progress of a job to allow for the possible need for *recovery* after a failure.

Checkpointing. Means the practice of writing a *program* in such a way that it automatically *dumps* information at frequent intervals throughout a job, the job to be restarted in the event of a *failure.*

Check Problem. A problem having a known solution which is used to check that a *program* or machine is working correctly.

Check Register. Refers to a *register* which is used to store input dat temporarily before it gets compared with the same data input at a different time or by a different path. It is form of *transfer check.*

Check Row. A *row* (or rows) on *paper tape,* forming part of an item *field* on the tape and attached to the field to act as a *check symbol*, allowing a *summation check* to be made for that item if the tape is used as input to a computer.

Checksum. A means of verifying accuracy by summing groups of digits and comparing the result against a previously calculated sum.

Check Symbol. A digit or digits which are generated for a particular item of data by carrying out an *arithmetic check* on the item. These digits are then attached to the item and accompany it through various stages of processing so that the *chech* can be repeated for validating the item at each stage.

Check Word. A *word* appended to a *block* of *records*, and having data generated for that block, to act as a *check symbol* when the block gets transferred from one *location* to another.

Chip. An integrated circuit which is etched on a tiny piece of silicon or germanium.

Chopper. A device which is used for interrupting a current or a beam of light to produce a pulsating signal. Sometimes it is done to achieve timing pulses, as for example in a photo-electric cam. In the case of a continuous current signal a chopper *amplifier* is often used so as to amplify the signal in the presence of *noise.*

Chopper-Stabilized Amplifier. A device including a *modulator*, an a.c. coupled *amplifier* and a *demodulator*, for stabilising stabilize fluctuations in a circuit. The modulator serves as a *chopper.*

CIM. Computer Input Microfilm (acronym, pronounce letters individually). A system using microfilm technology rather than printing on paper.

Circuit. A connector of electronic devices and wires, used to carryout certain types of functions. Electrical current flows through it. *See printed circuit board.*

Circuit Capacity. Refers to the number of channels in a circuit that can be dealt with simultaneously.

Circuit Diagram. Refers to the physical representation of components and interconnections which define a specific *hardware functional design.*

Circuit Noise Level. Refers to a measure of the disturbance in a *data transmission* circuit. It is usually expressed as a ratio of the *noise* measured in a circuit in relation to some chosen reference level.

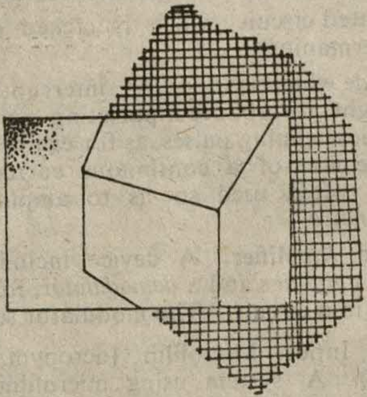
Circulating Register. A *register* in which digits are shifted around in circular fashion, in such a way that digits removed from *locations* at one end of the register get automatically inserted at the other end.

CIS-COBOL. Acronym for Compact Interactive Standard *COBOL.* A version of COBOL which was designed to run on, and be portable between, a number of *personal computers.*

Clear Band. In relation to *optical character recognition*, any area on a document which must be kept free of printing.

Clear to Send. (CTS). An RS-232 standard control signal which is used in line control sequences to indicate the availability of a data link for transmission in a particular direction.

Clipping. A program procedure which is used to avoid unwanted "wrap-around" or the shifting to the side of an image too large for the display. A clipping procedure determines which parts of the picture are lying outside the screen's boundaries, and eliminates those portions.



Clipping

Clock. (CLK). A component which is designed to generate regular pulses in order to synchronize the timing of events within a computer system, such as memory cycles and circuit switching. It is also used as a timing device for coordinating synchronous transmissions.

Clock Pulses. Electronic pulses used to control the timing of all circuits within a machine. The pulses are emitted repetitively from a *master clock* in order to synchronize the operations carried out by the machine. A clock pulse is also called a clock signal.

Clock Rate. The frequency at which pulses are generated from a clock.

Clock Track. Refers to a track on a magnetic recording medium which provides *clock pulses* to control *read* and *write* operations.

Closed Loop. Refers to a continuous *loop* in a *program* from which there occurs no exit except by operator intervention or by action on the part of some *executive program* monitoring the operation of the *program* concerned. A closed loop is usually an error, and may be signalled by a *hoot stop*.

Closed Shop. Describing a method which is used for running a computer installation, particularly with regard to the testing and running of *programs* under development.

Closed Subroutine. A *subroutine* generating a re-entry point for returning to the *main program* in accordance to conditions established on entry to the subroutine.

Cluster. A group of devices such as *magnetic tape units* or *terminals* which are interfaced to a *communications network* or *host processor* through a cluster controller. This is carried out in such a way that the *software* is not necessarily aware that one controller is permitting a number of devices to share an *interface*.

CMOS. Complementary Metal Oxide Semiconductor (acronym, pronounce first letter individually, rest as one word). A large scale integration (LSI) technology that is needing low power consumption and is, therefore, used in portable applications and for battey-assisted memory systems. *See large scale integration.*

Coaxial Cable. A transmission line having an inner conductor and an outer shield conductor. It is popular for local area networks (LANs) and other forms of transmission.

COBOL. Common Business Oriented Language (acronym, pronounce as one word). A high level programming language which is particularly useful in business application due to its Engishlike self-documenting feature and its ease of output format.

CODASYL. Conference On Data Systems Languages (acronym, pronounce as one word). A committee which was developed by the U.S. Department of Defense. The CODASYL committee adopts specifications for standards such as the language COBOL and the data base standard celled NETWORK MODEL 1. These have been incorporated into several industry offerings. *See COBOL.*

Code. (1) A system of symbolic characters which are used to represent data; (2) Refers to the set of instruction in a computer program.

Code Area. An area of *main storage* having at a particular moment, executable *code* representing processing *instructions*, as distinct from areas containing only data.

Coded Decimal. A notation in which each decimal digit is separately represented in coded form *e.g.*, by the *binary notation* of the digit.

Code-Directing Characters. Characters which are attached to a message to indicate the routing and destination of that message.

Code Elements. Refers to the basic elements from which a code is constructed; *e.g.*, the individual *bits* making up a 6-bit *character code.*

Code Holes. Holes punched in *paper tape* or *punched cards* for recording data.

Code, Numeric. Refers to the representation of data as coded groups of *bits* to denote numerals; *e.g.*, in *binary-coded decimal* format. Contrasted with *alphabetic code.*

Code Position. Any part of a data medium into which a code may be inserted.

Coder. A person who is able to write computer *instructions* from *flowcharts* prepared by others, as distinct from a *programmer*, who is able to prepare the flowcharts as well as *coding* from them.

Code Segment. An area of *storage*, which represents a subdivision of the storage allocated to a *process*, and has executable *instructions.* Other segments forming part of the process include *data segments* and *dump segments.*

Coding. Refers to the writing of *instructions* for a computer. Coding is part of the activity of *programming.*

Coding Check. A check which is carried out to ascertain whether a *routine* contains errors.

Coding Sheet. Means a form on which computer *instructions* are written before being transferred to an input medium *e.g.*, *punched cards.*

Cold Start. Starting the system after a crash, or when it has not been in use.

Collating Sequence. The order in which various sets of data are merged when they are combined into one.

Collator. The term used for a machine for merging two *punched card files* (sorted into the same sequence) into a single file, which would be in the same sequence. Cards which matched could also be separated from those which did not match; thus a collator could also be employed for card selection. It is also known as *interpolator.*

Column Binary. Refers to a method for representing *binary numbers* on *punched cards*; consecutive *punching positions* on each *card column* are regarded as consecutive digits in a binary number.

Column 1 Leading. The way in which *punched card* had been kept in the feed *hopper* of some punched card machines; *i.e.*, with a short edge leading and with column 1 read first.

Column Split. Means the facility on a *punched card* machine for reading two parts of a *coulumn* as two separate codes or characters.

COM. Acronym for Computer Output on Microfilm.

Command. Typically, the portion of a computer instruction that specifies what operation is to be carried out for example, add, goto.

Command Chain. Refers to a part of a *process* which can be *executed* independently as a sequence of *input/output instructions.*

Comment. Written notes included in the coding of computer *instructions* so as to clarify the procedures, but which do not have effect on the computer itself, *i.e.*, are not translated into *machine language*. It is also known as *annotation, narrative.*

Commercial Data Processing. *Data processing* which is concerned with or controlling a commercial application; *e.g.*, *inventory control*, payroll.

Commercial Language. A *language* which has been designed for the writing of *programs* for commercial applications such as payroll, invoicing. *See COBOL.*

Commission Refers to instal a computer to the point where it is capable of successful operation.

Commodore. A manufacturer of microcomputer equipment and software.

Common Area. Refers to an *area of memory* used by more than one *program*, or more than one *segment* or *routine* of the same program.

Common Business Oriented Language. *COBOL.*

Common Language. Refers to the representation of data in a form intelligible to the many different units of a *data processing system*, so that information could be transferred between parts of the system.

Common Storage. Refers to a portion of memory for each user that holds data or parameters that are accessible to all programs.

Communication Channel. A channel which is used for transmitting data between distant points; *e.g.* to connect a remote data station to a central computer system.

Communications Line Control Procedure. A particular procedure which is used in a communications network for controlling signals from a particular class of device or method of transmission.

Communications Link Controller. A *hardware* device which contains *software* or *microprograms*. It is designed to interfere between a *main frame* system and a communications network.

Commutator Pulse. One of a group of pulses which are used to set the limits of a *digit period*. It is also known as P-pulse (abbreviation of position pulse)

Compact Disk. A storage device which uses *optical laser storage* techniques and thereby providing robustness, ease of handling and greatly enhanced storage capacity.

Comparator. A device which is used for comparing two items and producing a signal dependent on the result of the comparison.

This may be used for comparing two different items or two versions of the same item in order to check data transference.

Comparing Control Change. Refers to a change in the value of *control field* in a *record* which made defined actions to take place, *e.g.*, the production of totals on a *punched card tabulator*. It is also farmed as *control break*, control change.

Compatible Software. (1) The ability of software to be run on different computers without modification; (2) A feature that enables different application software programs, such as Visicalc ^{TM}, to share common conventions and rules so that they can be employed together.

Compatibility. It is said to exist between two computers when *programs* could be run on both without alteration. A computer is considered to be 'upwards compatible' with another if a program written on the first can be run on the second, but not vice versa.

Compiled Module Format. An intermediate format which is used in the process of *program compilation*. It is usually created prior to the consolidation or collection of program *modules* into the final from ready for *loading*.

Compiler. A program which is designed to translate high level language (source program) into machine language (object program). A compiler is able to translate the entire high level source program into an object program before processor execution starts (compare with interpreter). All high level programs must be either compiled or interpreted before they can be executed. A compiled program runs more quickly than an interpreted program because the translated code for each statement of the completed version has been stored on disk or tape and can be run at any time, while an interpreted version needs to be translated (or retranslated) each time it is run.

Compiler-Compiler. A *program* which is capable of accepting the syntactical and semantic description of a *language* so as to generate a *compiler* for that language.

Compiler Diagnostics. The facilities which are incorporated in a *compiler* to detect, and indicate to the user, errors in *source programs.*

Compiler Manager. *Software* controlling the *compilation* process-usually part of the *operating system.*

Compiler Target Machine. The machine which is potentially available from a specific *hardware/software* system, for which a *compiler* is capable of generating *programs.*

Compiling System. A collection of *software modules* which forms part of an *operating system.* It is used to convert *source language* into *object code.* The compiling process may have several stages including *compilation, collection* and *loading.*

Complementary Operation. A *Boolean operation* having a result which is the *negation* of the result of another operation is said to be a complementary operation to the other e g., the *or operation* is complementary to the *nor operation.*

Complementing. Refers to the method of producing the negative of a number by obtaining its *complement.* Contrasted with *negation.*

Complete Operation Refers to the complete implementation of a computer *instruction,* which involves the *accessing* of the instruction and associated *operands,* obeying the instruction and placing the result in *store.*

Computer Mode. Refers to the operating mode for an *analog computer* in which the input signals have been connected directly to the computing units to develop a solution.

Computer. Any machine which is able to accept *data* in a prescribed form, process the data and supply the results of the processing in a specified format as information or as signals for controlling automatically some further machine or process. The term is used generally for any kind of computing device, the three main categories being *digital computers, analog computers* and *hybrid computers.*

Computer Aided Design. Refers to the process of applying computer technology to design, so that a designer is able to use a computer *terminal* as a window to necessary data, a draughting board, and a tolerance anylysis tool.

Computer Aided Instruction. (CAI). An educational procedure which is supported and assisted by computers. It includes electronic tutorials and automated worksheets. Also called computer assisted instruction.

Computer Aided Learning. A computer-based tutorial method using the computer to pose questions, provide remedial information and chart a student through a course.

Computer Aided Manufacturing. Refers to a computer-based system of integrating a number of aspects of manufacturing system, so that inventory control, manpower scheduling, order processing, etc. get integrated with design and process control.

Computer Efficiency. Refers to a measure of the reliability of a computer.

Computer Graphics. Graphs, charts, and/or drawings which are generated by a computer. They are displayed on a video screen or printed by a plotter or printer.

Computer Literacy. General learning, knowledge and fluency with computer terms and computer usage.

Computer System. A computer that takes information in various forms as input and, through logical and mathematical operations, transforms the data into a suitable form either for further processing or for use as is.

Computing amplifier. An amplifier in which the output voltage is related by *negative feedback* to the input voltage. It is also known as operational amplifier.

Concatenate. To chain together, to link, or to arrange as a series, retaining the original order within each of the chained items.

Concurrent Conversion. Means the simultaneous running of *conversion programs* with normal programs.

Condensing Routine. Refers to a *routine* for transferring an *object program* from *memory* or a *storage device* onto *punched cards* in such a way that the maximum number of *instructions* possible was contained on each card.

Conditional Branch. Refers to a transfer of control within a program. It is dependent upon a certain condition being met by either a mathematical or logical operation or a combination of the two.

Conditional Branch Instruction. A branch instruction that is effective only if a specified condition holds, *e.g.*, specified register contents zero, nonzero, negative, etc.

Conditional Breakpoint. Refers to a *breakpoint* at which the particular sequence of *instruction* to be followed after the external instruction has taken place may be varied by setting specified conditions.

Conditional breakpoint Instruction. A *breakpoint instruction* which acts, after the external intervention has taken place as a *conditional branch* by which alternative courses of action may be entered.

Conditional Implication Operation. Refers to a Boolean *operation* in which the *result* for the values of the *operands* p and q is given by the following table :.

Operands		*Result*
p	q	r
0	0	1
1	0	0
0	1	1
1	1	1

Conditional Stop Instruction. An *instruction* causing a *program* to be stopped if some given condition is detected. For instance, the program may be required to stop if it finds that a *console switch* has been set by the operator.

Conditional Transfer. Synonymous with *conditional branch instruction.*

Conditional Transfer of Control. Refers to *transfer control* to another part of a *program* by using a *conditional branch, i.e.*, depending upon certain specified criteria.

Configuration. The particular hardware elements and their interconnection in a computer system for a particular period of operation. *See also* reconfiguration.

Configuration Block. Refers to a collection of *hardware* devices which are responding to a particular type of *command* given by the operator when configuring the computer for operation.

Configuration Table. A table which is maintained in a computer by the *operating system* for signifying the status of individual units of the system.

Connexion Box. A mechanical device which is used in some *punched card* machines for controlling operations by using variable linkages. The mechanical equivalent of a *plugboard.*

Connexion (of A Node). A link between an *application program* and a resource (*e.g.*, a *peripheral* device) which is established under control of an *operating system* and represented by entry in the *catalogue*.

Consistency Check. 1. A check carried out by *program* to ensure that a *record*, or *transaction*, does not have contradictory data. 2. A check carried out to ensure that a result is *accurate*, achieved by using alternative techniques to derive answers which are then compared.

Console. The unit of a computer which is used for all manual communication with the computer. The console gives a display of information from the computer, either through a *printer* or through screen messages, and offers a means for the operator to put messages into the computer, again either through a typewriter or by the depression of switches.

Console Display Register. A special *register* into which data can be loaded by program, or under operator control, for allowing data to be displayed by a visual indicator on the *console*.

Console Switch. A *switch* which can be set from an *operator's console*, enabling a *program* to alter its actions in accordance to the setting it detects.

Console Typewriter. Refers to a unit of the *console* whereby the computer can display messages to the operator and the operator can input instructions to the computer. Console typewriter messages are of two types : messages informing the operator of actions required, *e.g.*, *disk drives* requiring attention, paper running low on the *printer*, and messages output from a running *program* providing information on the progress of the *run*, *e.g.*, the printing of *control totals*.

Constant Area. The part of store which is *allocated* by a *program* used to hold *constants*.

Constants. In a *program* constants refer to items of data which do not get changed for each *run*.

Construct. Refers to a statement in a *source program* which will produce a predetermined effect when executed.

Contention. Refers to the condition which arises when using *multiplexor channel time sharing*, and more than one unit tries to transmit at the same time.

Contention System. A "trial and error" technique of transmitting data on a local area network (LAN). If the data channel is free, transmission may take place. If not, the sending station must wait and try at a later time. A contention system allows multiple users without requiring central control.

Continuous Stationery. A continuous supply of paper which consists of several hundred individual sheets separated by perforations and folded to form a pack. The stationery has been designed for automatic feeding through the print unit of a *line printer* and sprocket holes are punched for this purpose in the margins of each sheet.

Continuous Tone Image. A black and white or color image which is formed of combinations of separate areas made up of different color tones or grey tones. *Contrast with line drawing*.

Contrast. In *optical character recognition* (OCR), it refers to the difference in colour or intensity between the character and its background.

Control. Refers to the function of interpreting and acting upon *instructions*, or carring out required operations when certain specific conditions take place.

Control Break. A *key change* which takes place in a *control data* field.

Control Card. 1. A *punched card* which contains data required for control purposes, *e.g.*, *control totals*. 2. A synonym for *parameter card*.

Control Character. (1) A character which initiates some kind of physical control action but which is not printed on the output page; for example, line feed, tab, form feed; (2) A character which turns off a peripheral device or a printer; (3) Sometimes control characters are used in combination with other characters in order to define unique commands. For example, "CTRL" (control key) and "C" together might tell the system to abort the program.

Control Circuits. The circuits in a computer's *control unit* which are used to carry out the operations initiated by the computer *instructions*.

Control Computer. A computer which is used in *process control* where the process under control feeds signals to the control computer, which in turn sends signals back which directly control the operation of the process.

Control Data. Referring to *records* in *punched card* practice which are bearing *keys* or information of certain significance in *batching* and sequencing the records.

Control Field. Refers to a *field* within a *record* where *control data* is held. The presence or absence or chane in value of the contents of the control field will make specified *operations* or *routines* to take place.

Control Holes. Refer to punchings in a *punched card* which revealed how further data in the card was to be treated in the machine.

Control Information. Information sent between devices so as to control their functions.

Control Key. Typically referring to a key on the CRT keyboard that is able to control some cursor or program function; for example, move cursor up, move cursor right, or branch to a certain program routine. When pressed simultaneously with another key—"CTRL" "Q", for example—special functions such as block moves or deletions may be invoked.

Control Language. In a *operating system*, it refers to the set of *commands* which are available to the user for the organization and control of the *programs* and *resources* available in the computer system.

Control Language Interpreter. A *softare* routine which is able to *read*, *interpret* and *execute* statements written in a *control language*.

Controller. Electronic circuitry, usually a microprocessor, that allows communication between a computer processing unit and a peripheral device.

Control-Message Display. A device which is able to display control information (*e g*., information on the operation of a given *program* as it is being run), in plain language. A *console typewriter* is an example of a control-message display.

Control Panel. Refers to the part of the console that actually contains the controls and indicators.

Control Register. A *register* whose function is to have the *address* of the next *instruction* in the sequence of operations.

Control Sequence. Refers to the normal order in which *instructions* are acted on in a computer. A *transfer of control* is said to take place if a *branch instruction* alters the normal sequence.

Control Stack. A *hardware* mechanism which consists of a number of *storage locations*. It is used to provide procedural control over processes within the computer, to assist in the *dynamic allocation* of work space, 'and to carry out arithmetic.

Control Statement. In a *high level programing language* the expression *statement* refers to an *instruction* while a control statement is a *directive* to the program used to cause actions to take place according to specified conditions.

Control Tape. A closed *loop* of punched *paper tape* or plastic tape which is used to control the operation of printing devices.

Control Total. A total which is established for a *file* or group of *records* during a specific operation (*e.g.*, a computer *run*) for checking that the processing operation has been applied to all records.

Control Transfer. Refers to the departure from the normal sequence of *program instructions* which takes place when a *branch instructions* is obeyed.

Control Unit. Refers to that part of computer *hardware* which *accesses instructions* in sequence, interprets them and initiates the appropriate operation required.

Control Unit, Peripheral. *Peripheral control unit.*

Control Word A *word* in *store* which is having information used for control purposes. These purposes are dependent on the type of control involved.

Conversational Compiler. A *compiler* using the *conversational mode* of computer operation in which the user is entering each *source language statement* in turn to the computer, which immediately checks its validity and informs the user if he could proceed or must correct a mistake.

Conversational Mode. Refers to the communication between a computer and user in which both the computer and the human respond. It is same as interactive.

Conversion. 1. Refers to the process of transcribing a *file* from one format to another on the same or a different *storage* medium—*file conversion.* 2. Refers to the process of converting a *source program* from one *dialect* of a language to another (*e.g.*, when converting programs written for a specific range of computers to another range)—*program conversion.*

Conversion Equipment. Equipment used for carrying out data conversion without involving a *processor, e.g.*, a *card-to-tape converter.*

Conversion Program. 1. A computer *program* which is designed to carry out data *conversion*. 2. A computer program which is designed to convert programs written for one computer system into programs capable of being run on a different system.

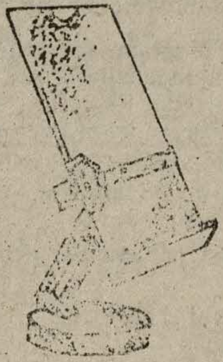
Coordinate Paper. A continuous-feed graph paper which is used for printouts produced on a plotting device, such as a flat-bed plotter.

Coordinate System. Refers to a representation of measurement along axes (intersecting lines). It is used to create graphs showing computation results or comparisons.

Co-Processor. An auxiliary processor which is devoted exclusively to time-consuming tasks, such as floating point arithmetic, so as to free the central processing unit (CPU), resulting in faster execution. In some setups, this type of chip is used to emulate a different computer. *See central processing unit.*

Copy. To reproduce data from one *storage device* to another, or another part of the same store, without altering the original data.

Copy Holder. A unit for holding papers so they can be easily read by the user while typing on a keyboard. Same as data holder.



Copy Holder
(or data holder)

CORAL. A *high-level language* for *real-time applications.*

Core. A storage technology used in older computers before semiconductor memory became popular. Core is a nonvolatile high-spped storage which consists of tiny magnetic "donuts."

These units are able to retain either a positive or negative charge to represent digital information.

Core Dump. Refers to the transferring the contents of *core storage* to an *output device, e.g.,* a *line printer* or *paper tape punch.*

Core Memory. A computer *memory* or *store* which is composed of *magnetic cores.*

Co-Resident. If two or more *routines* are held in *main memory* at the same time, they are said to be co-resident.

Core Storage A type of *memory* which is composed of magnetic *cores*, in which data is held in *binary* form by means of the property of cores of retaining a positive or negative charge. The pattern of charges represents the coded data.

Corruption. Refers to the mutilation of *data* or *code* which is caused by a failure of *hardware* or *software* or an error in an *application program.*

Counter. Any device which is used to accumulate totals. For example, an electro-mechanical device on a *punched card* machine, or in a *digital computer* a *memory* location or *register* is used as an *accumulator* or to record a number of repeated *loops* in a *program.*

CPM. Critical Path Method (acronym, pronounce letters individually).

CP/M-80TM. Control Program for Microcomputers (acronym, pronounce letters individually). An operating system which was developed by Digital Research, Inc. for the Intel 8080 and ZILOG family of 8-bit word size microprocessors.

CP/M-86TM. Control Program for Microcomputers (acronym, pronounce letters individually). An operating system which was developed by Digital Research, Inc. for the Intel 8086/8088 16-bit word size family of microprocessors. It was derived from the CP/M-80. *See preceding entry.*

CP/NET. CP/M NET work (acronym, pronounce first two letters individually, rest as one word).

Cps. Refers to characters per second (acronym, pronounce letters individually).

CPU. Refers to Central Processing Unit (acronym, pronounce letters individually).

CPU Handshaking. Refers to interaction between a CPU and peripheral devices or, in some cases, between the CPU and users.

CPU Time. Refers to the amount of time which is needed for an operation to be completed.

CR. Carriage Return (acronym, pronounce letters individually). Also "ENTER."

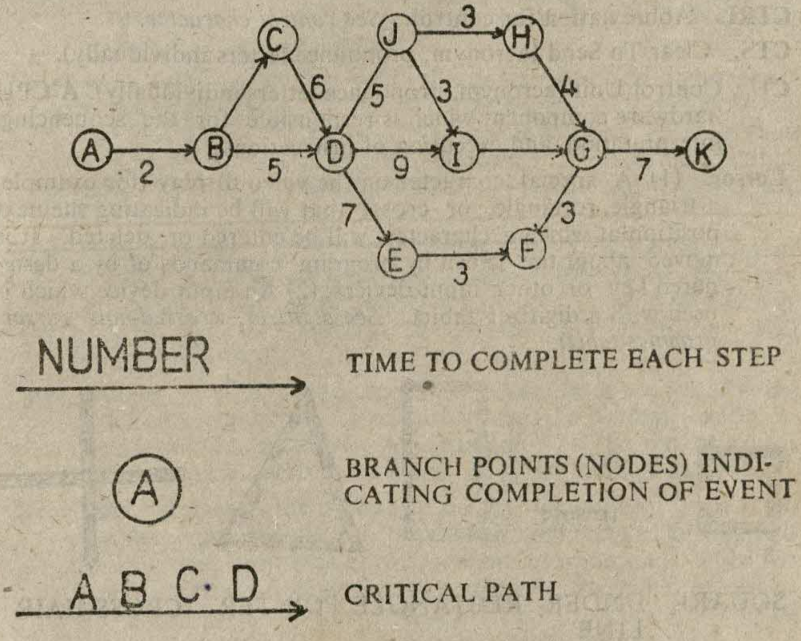
Crash. Refers to the condition of a system that has become unusable; the cause may be either a hardware malfunction or a software problem.

CRC. Cyclic Redundancy Check (acronym, pronounce letters individually) A bit check that is used for detecting incorrect transmission of data. The data has a mathematical operation carried out on it at the sending end. The operation is repeated at the receiving end so the two could be compared.

Crippled Leap-Frog Test. A variation of *leap-frog testing* in which the test arithmetic is carried out on only one part of *store*, not on different *locations*.

Crippled Mode. A machine operating in crippled mode when certain parts are not working, but the system is still capable to operate at reduced capacity.

Critical Path Method. (CPM). A technique that defines a project in terms of its component events. By ordering the events and showing their interdependency, this method permits the user to isolate the critical events, whose delay might delay overall completion of the project. These events are said to lie on the critical path. A diagram maps parallel "paths" along a time scale so as to show the "critical path" of those functions which, if delayed, would postpone the entire project. Those functions that may have slack could also be identified.


A
B
C
D
E
F
G
H
I
J
K
2
5
6
5
3
3
4
9
7
3
3
7
NUMBER
TIME TO COMPLETE EACH STEP
A
BRANCH POINTS (NODES) INDICATING COMPLETION OF EVENT
A B C· D
CRITICAL PATH

Critical Path Method

CROM. Control Read Only Memory (acronym, pronounce as one word). The storage area in a CPU which is set aside for micro insuructions which, when grouped together, form procedures like branch, add, etc.

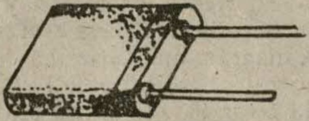
Cross compiler. A *complier* which is used on one computer system to provide *object code* in accordance with the format needed to run on a different type of computer.

CRT. Cathode Ray Tube (acronym, pronounce letters individually).

CRT Terminal. Refers to a cathode ray tube screen for display of data combined with a keyboard for data input, *See cathode ray tube, keyboard.*

Cryptographic. Referring to a system for coding data in order to conceal its meaning.

Crystal. A quartz crystal that, due to its piezoelectric properties, vibrates at a specific frequency if energy is supplied to it. The vibrations provide a highly accurate frequency by which to time the clock within a computer system. *See piezoelectric.*



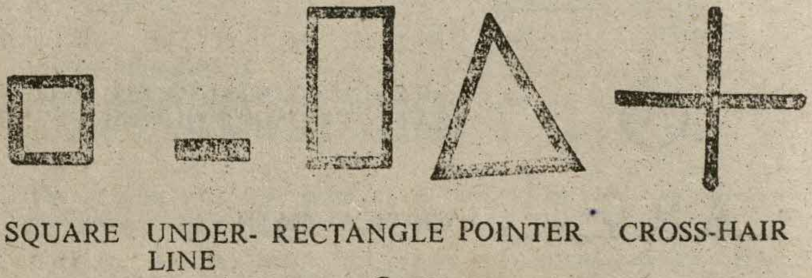
Crystal

CTRL. Abbreviation for control. *See control character.*

CTS. Clear To Send (acronym, pronounce letters individually).

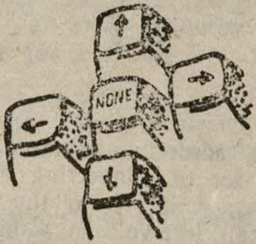
CU. Control Unit (acronym, pronounce letters individually). A CPU hardware component which is responsible for the sequencing, interpretation, and execution of instructions.

Cursor. (1) A special character on the video display (for example, a triangle, rectangle, or cross) that will be indicating the next position at which a character will be entered or deleted. It is moved about the screen by program commands or by a designated key or other input devices; (2) An input device which is used with a digitizer tablet. *See digitizer, crossed-hair cursor; graphics tablet.*



Cursors

Cursor Control keys. Specifically designated keys on the keyboard which are used to change the position of the cursor on the display screen.



Cursor Control Keys

Cursor Positioning. Refers to the action of moving the cursor in different directions; up, down, right, left, home (upper left corner of screen), bottom of screen, etc.

Cursor Tracking. Controlling a cursor on a graphics display by moving a stylus on a graphics tablet connected to the terminal. *See graphics tablet.*

Curve Follower. A peripheral device that will be able to read data represented on a graph.

Custom Software. Refers to the program designed by special order to serve a user's specific requirements. It is more costly than packaged or canned software.

Cybernetics. Refers to the field of science which is involved in comparative study of the automatic control of, regulation of, and communication between machine and man. These studies comprise of comparisons between information-handling machines and the brains and nervous systems of animals and humans.

Cycle Index Counter. A *counter* which is used to count the number of times that a given cycle of *program instructions* has been carried out. The cycle index counter can be examined at any selected time to ascertain the number of repetitions still required in a *loop.*

Cycle Stealing. Refere to the use of idle time in a processor's instruction cycle for operations other than the normal execution of program instructions. An example is the execution of input/output requests from a disk drive or terminal controller.

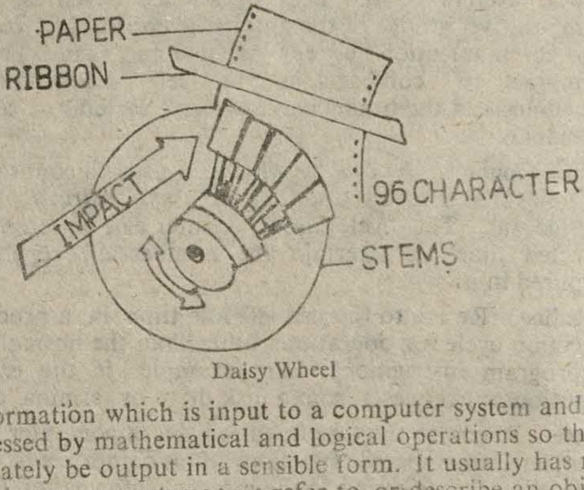
Cycle Time. Refers to the time required by a computer system to complete any specific function. This comprises of the elapsed time interval, beginning at the moment information is called for from a storage location or device through the time at which the information is made available and the device is able to complete its internal cycle to become ready for use again.

D

D/A. Digital to Analog (acronym, pronounce letters individually). Refers to the act of converting digital electrical signals (individual, separate units) from the computer into analog (continuous) signals, like voltage, sound, etc., in order to drive external devices (such as a music synthesizer) that need analog input.

Daisychain. A number of devices which are connected to a controller by a method allowing a cable to connect one device to the controller and then allowing a separate cable to connect the first device to a second; a third cable connect a third device to the second, and so on.

Daisy Wheel. A type of print element which finds use in some letter quality printers. It is shaped like a wheel having radial spokes; each possesses a single raised character on the end. As the wheel turns the spokes are impacted by a tiny hammer. This type of printer provides better print quality than a dot matrix printer, but at a higher cost.



Daisy Wheel

Data. Information which is input to a computer system and is then processed by mathematical and logical operations so that it can ultimately be output in a sensible form. It usually has numbers, facts, letters, or systems that refer to or describe an object, idea, condition, situation, relationship, or other type of information.

Data Acquisition Control System. A *computer system* in which high speed data channels are used to connect a central computer to distant locations. Essentially it is a system which is designed to operate in *realtime* applications within obtaining data from a number of remote stations, and transmitting data to them under *program control.* The *data collection devices* within such a system may cater for both *analog* and *digital* forms of data *input* and *output.*

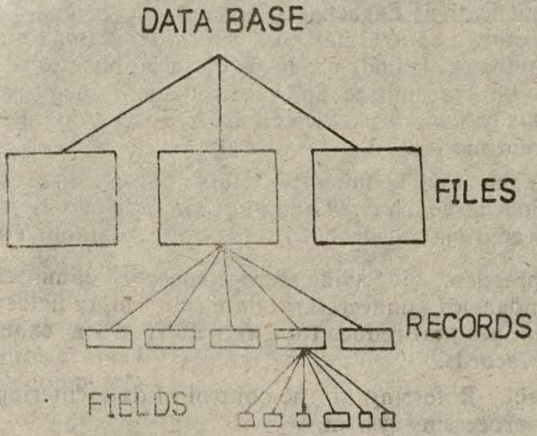
Data Adapter Unit. A unit which is designed to allow a *central processor* to be connected to a number of data *communications channels.*

Data Administrator. A person who is responsible for control of data within an organization which is implementing a *data management* system.

Data Area. An area of *store* having *data* rather than *executable code* forming part of the system *software* or *application program.*

Data Bank. A comprehensive *file* of *data* which is usually stored in a *direct access storage device.*

Data Base. An organization of data files having information or reference material on a particular subject, or subjects. It is typically structured so that headings or keywords can be referenced easily, which permits efficient and simple access to—and retrieval of—records, The individual files are further structured into a hierarchy of records and fields.



Data Base

Data Carrier. A general term which refers to a medium for recording data, *e.g., magnetic disk.*

Data Carrier Store. Any form of *data storage* in which the storage medium is external to the computer.

Data Chaining. Refers to a technique in which parts of records are stored in areas that are not contiguous, but are referenced as a whole by each record having the ability to call the next.

Data Channel. A two-way link for communication between two points.

Data Channel Multiplexor. A device which is usually associated with a central computer and is servicing a number of *communications channels*, any of which may be transmitting or receiving data from the computer.

Data Collection. Refers to the process of capturing *raw data* for use within a *computer system.*

Data Collection And Analysis. Referring to a system in which a number of *data collection* points are connected directly to a *central processor*, so that data can be collected and automatically analysed as events arise. Such techniques find use in both *real time* commercial systems and in industrial *process control* applications.

Data Communication. Refers to the technology covering the transfer of computer encoded information from one point to another by means of various transmission system.

Data Communications Equipment. (DCE). The equipment which is associated with the transmission of of data from one point to another; for example, a modem use to link a computer to a remote terminal accomplished by connection to a phone line.

Data Communications Exchange. Refers to a special *hardware unit* connecting a control unit of a *central processor* to a communication network. It finds use in *real time* applications where data is to be transmitted and received simultaneously over several *communications channel* which are perhaps operating in many different modes.

Data Communication Terminal. Refers to a distant or *in-plant* terminal at which *input* and *output devices* may be stationed and connected via a *channel* to some central computer system.

Data Compression. (1) Saving storage space by elimination of gaps, redundancies, unnecessary data, or empty fields; (2) Display techniques that reduce time and effort when examining whole data records.

Data Control. Referring to the control of data entering or leaving a data processing system.

Data Conversion Language. A language which is used to describe the data structure of *files* to be transcribed under the operation of a file *conversion* routine.

Data Description. Refers to the specification of an element of data in a *source program* which is written in accordance with the rules for a particular programming *language.*

Data Desrciption Language. A language which is usad in a *data base management system* for describing the structure of *records*, *data elements*, *files* and their relationships.

Data Display Unit. A term referring to a *visual display unit* in which data stored in *memory* can be selected and displayed as characters or graphs upon a screen. Sometimes a *data display unit* may involve a *light pen* to enable graphs to be modified by a user under *program control*.

Data Element. Any item of data which for a given situation may be regarded as a unit, *e.g.*, *field*, *record*.

Data File. A system of information organization on disk. For example, a customer data file might consist of records which are describing basic customer information. Each record would represent one customer of the company.

Dataflow Computer. Refers to a computer in which *data* values are flowing from operations which produce them to the operations which use them as *operands*. An example of *non von Neumann architecture*.

Data Handing Equipment. In the broadest sense any equipment which is used to process data, but more specifically equipment used in *automatic data processing systems*.

Data Link. Refers to the physical communications path used for information transmission between two points.

Data Link Level In the ISO *seven layer reference modal* for communications *protocols*, the second level which controls the accuracy of data transfer.

Data Logging. Refers to the recording of data and data movements taking place at a specified point in a system.

Data Names. When a *program* is written in a programming *language*, items of data are allocated data names which are specified as part of the *source program*. These names serve *operands* in the source program *instructions* and replace the *addresses* of the items of data that they represent.

Data Net A *data communications exchange* which is able to control the transfer of messages to and from remote terminals and a central computer.

Data Plotter. A device which is designed to give a visual display, usually in the form of a graph on paper, by plotting the course of coordinates. It is also known as X-Y plotter.

Data Processing. Refers to the input, storage, manipulation, and dissemination of information using sequences of mathematical and logical operations.

Data Purification. Refers to the process of validating and correcting data to reduce the number of errors entering a data processing system.

Data Record. A *record* having a unit of data for processing by a computer *program*.

Data Reduction. Refers to the transformation of raw (unprocessed, crude) data into more useful condition by statistical methods designed to cull, smooth, order, or otherwise improve its accuracy or arrangement.

Data Reduction. Refers to the selection and *editing* of *operands* to derive facts from large volumes of *raw data*.

Data Reduction, On-Line. Refers to accept data from a source directly *on-line* to a computer and to *edit* and arrange that data into an ordered format.

Data Representation. The use of characters (*i.e.*, numerals, letters and special symbols) for representing values and descriptive data. In a digital computer all *program instructions* and data have been recorded as electrical impulses arranged in coded form.

Data Segment. A sub-unit of the *storage* which is allocated to a particular *process*. It is used to contain *data* rather than *executable program code* forming part of the *application program* or system *software*.

Data Set. A group of data elements that are related.

Data Sink. Any device that can accept data signals from a data transmission device.

Data Statements. *Statements* which are written as part of a *source program* to identify and specify the format of data items used in the program.

Data Station. A unit which is incorporating data processing *input* and *output devices* and which is connected to a telephone or telegraph circuit by a *data set* to allow direct communication with a central computer.

Data Station Consol. A *consol* which is situated at a distant *data terminal* to control the operation of the various *input* and *output devices* located there, and to control communication between the *data station* and a central computer.

Data Stream. A ssquence of *data elements* which are being transmitted in a continuous flow along a *communications channel*.

Data Terminal. A remote station which is used to transmit and receive data from a central computer. *Data communication terminal*.

Data Terminal Equipment. (DTE). Any piece of communication equipment that sends or absorbs data.

Data Transmission. Referring to the automatic transfer of data from one computer system to another, or to and from a central computer and distant *data collection* points.

Data Unit. A group of one or more characters which are related in such a way that they from a whole.

Data Word. Any unit of *data* which is stored in a single *word* of a storage medium.

DBMS. Data Base Management System (acronym, pronounce letters individually). Application software which was designed to organize data so that they can be quickly filed in/or retrieved.

Daughterboard. A *board* which is connected to and extending the capacity of, a motherboard or *backplane.*

DCE. Data Communications Equipment (acronum, pronounce letters individually).

DDE. Abberviation of *direct data entry.*

DDL. Abberviation of *data description language.*

DDP. Distributed Data Processing (acronym, pronounce letters individually). Decentralized computer power arranged by hooking two or more processors together in a network so that each CPU is not tied up with processing information not related to its specific function. *See central processing unit.*

Deadly Embrace. Refers to a condition which arises when all processes active at the same time within a computer get suspended while competing for the same resources.

Dead Halt. A halt situation in which the system cannot return to the point at which it stopped. Same as drop dead halt.

Dead Time. A period of time which is allowed between two related events in order to avoid overlap or mutual interference.

Dead Zone Unit. A device which is used on an *analog computer* to give a constant output signal over a predetermined range of an input variable.

Deblocking. To extract *records* from a *block* of data so that the individual records can be processed.

Debugger. Systems software which is designed to aid the programmer in routine testing of software. Debuggers usually provide breakpoints and allow user to examine the contents of registers and memory locations.

Debugging. Trubleshooting, isolating, and removing errors or malfunctions (bugs) from a computer or a computer program to improve its accuracy or to restore its operation.

Debugging Aid Routine. Any *routine* which is used by programmers when testing *programs.* For example, a *diagnostic routine* or any routine for producing a *memory print*, *a tape print*, etc.

Debugging Suppression. Suppression of printing repetitions of the same bug in a program. Only the first occurrence of a bug in a loop will be printed out for examination. *See loop.*

Debug On-Line. Refers to test and correct errors in a *program*, using only certain sections of the *hardware* in a *multiprogramming* computer, thus permitting the *central processor* to continue to process other routines which may be *loaded* in *memory* at the same time.

DEC. Digital Equipment Corporation (acronym, pronounce as one word). Manufacturers of early computers and a variety of contemporary mini and microcomputer systems.

Decade. Refers to a group of ten storage *locations.* For example, a *magnetic drum* might consist of a number of storage *tracks* each having 200 words, the tracks being divided into twenty decades as the minimum unit of *access.*

deceleration time. Refers to a *storage device* which needs storage medium to be physically moved for *reading* or *writing* to take place. For instance using *magnetic tape*, the time required from the completion of a reading or writing operation to the moment if the tape is stopped.

Decentralized Data Processing. The organization of data processing activity within an organization so that computing equipment is deployed at several widespread branches to serve the operational needs of individual management groups.

Decimal Notation. In computers decimal numbers are usually represented by *binary digits* which are arranged in groups of four, each group corresponding to a digit of a decimal number.

Decision. An operation which is carried out by a computer to choose between alternative courses of action. It is by made by comparing the relative magnitude of two specified *operands*, a *branch instruction* being used to select the required path in accordance to the result obtained

Decision Box. A *flowchart symbol* which is used to represent a *decision* or *branch* in the sequence of *program instructions.*

Decision Instruction. Any *instruction* which is able to discriminate between the relative value of two specified *operands.*

Deck. 1 A collection or *pack* of *punched cards* which belong to a specific card *file.* 2. Also used as an abbreviation for *megnatic tape deck.*

Declaration. Synonymous with *declarative statement.*

Declarative Macroinstruction. *Instructions* which are used as a part of an *assembly language* to instruct the *compiler* (*or assembly program*) to carry out some action or take note of some condition.

Declarative Statement. An *instruction* which is written as part of a *source program* for specilying the *compiler* the format, size and nature of *data elements* and constants used as *operands* in the program. It is also known as declaration.

Decode. (1) To determine the meaning of a set of signals that describe an operation or an instruction to be executed; (2) To apply a code that reverses a previous encoding.

Decoder. A device that translates a set of coded signals.

Decollator. A device which is used *off line* in a computer system for separating multi-part sets of continuous stationery produced as output from a *printer.*

Decrement. Refers to decrease a variable or a counter by a fixed quantity.

Dedicated Channel or Line. A link which is used for communication between devices. Its function is solely devoted to serving those devices Typically, a dedicated line is leased from some carrier such as the phone company. Hence no one else but the lessee will be able to use that line. This is in contrast to a dial-up line where one only has "ownership" of the line for as long as the connection is made.

Dedicated System. A computer system which is designed for a primary application such as word processing or graphics. Additional applications may be possible with supplementary components and software.

Default Value. Values supplied by the computer system itself when no explicit value has been received from the program or user.

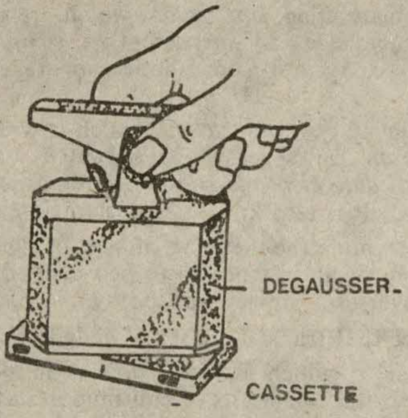
Defect. A fault in *hardware* or *software* which is liable to cause processing *failures* in a computer system.

Deferred Addressing. A form of *indirect addressing* in which several references become necessary before the desired address is found, the successive references being controlled by some pre-set *counter.*

Degausser. A device which is designed to demagnetize a magnetic tape. Also known as bulk eraser.

Degradation. Refers to the operation of a computer system, for providing a lower level of service in the face of failures in certain areas of the equipment.

Degradation Testing. Measuring the performance of a system at its extreme limit of operation.



Degausser

Delayed Updating. Refers to a method of *updating* a *record* or set of records in which *fields* in the records are not amended unless all alterations related to a specific transaction (or set of transactions) have been processed.

Delay Line Register. A *register* in which data has been stored by continually recirculating a signal.

Delay Line Store. A device storing information by continually regenerating a signal. The output from the device gets transferred via a *delay line* and is re-input. Thus, data in the store is circulated without alteration until such time as it is no longer needed whereupon the regenerating loop gets interrupted.

Delete. 1. Any operation for eliminating a *record* or group of records from a *file*. 2. To remove a *program* from the *memory* of a computer, *e.g*, at the end of a *run*.

Deletion Record. A *change record* which will make one or more existing records on a *master file* to get deleted.

Delimiter. A marker character which is used to limit the bounds of a group of related characters in a program, but which is not considered a member of the group. A character, a return, a comma, or a slash may be inserted as a delimiter.

Demand Processing. A system in which *data* has been processed virtually as soon as it has been received.

Demand Reading (or Writing). A technique for carrying out *input (or output) operations* in which *blocks* of data get transferred to or from the *central processor* as needed for processing.

Demodifier. An element of data which is used to reinstate a *basic instruction* to its original value.

Demodulate. To turn an analog signal back into a digital one.

Density. Refers to a measure of the compactness of recording for data storage. See *double density, single density.*

Deposit. To preserve the contents of an *area* of *memory* by *writing* to a *backing store.*

Depth Queuing. Technique which is used to enhance the three-dimensional appearance of a two-dimensional subject (pseudo 3-D). Examples are perspective and shading.

Descenders. Refer to the portions of printed or displayed alphabet letters that extend below their base line, including the letters *g, j, p, q* and *y*. Some dot matrix printers are not forming descenders below the letter base line.

Description. A significant *element* of data which is used to identify a *record* in which it appears.

Desktop Computer. Refers to a unit with physical dimensions that will fit conveniently on a desktop. *Contrast with minicomputer, mainframe.* Also, *see microcomputer, personal computer.*

Destination File. A term which is sometimes used to refer to a *file* that receives *output* data from a particular *run.*

Destructive Addition. Refers to an operation in which two *operands*, *addend* and *augend*, have been added to form a *sum* which appears in the *location* originally occupied by the augend.

Destructive Reading. Means an operation in which data has been taken from a *location* to a specified destination in such a way that the data in the original location gets lost or multilated.

DETAB. A programming *language* based on *COBOL*. However, it enables the user to specify problems in the form of *decision tables.*

Detected Error. Means an error in a system which has been detected, but not automatically carrected, before the output from the system has been produced.

Device Control Character. A character which is used in *paper tape codes* for controlling the operation of *data processing* or telecommunications equipment. It if is transmitted, or incorporated in any way in a *record* or *message*, it will not form part of the information conveyed.

Device Independent. Refers to the ability in a program to use input or output regardless of what type of peripheral device is being used.

Diablo™ The name of a Xerox-owned company that manufactures computer systems, peripherals and daisy-wheel printers.

DFG. Abbreviation of *diode function generator.*

Diagnosis. Refers to locating errors in *software*, or failures in *hardware.*

Diagnostic Routine. A *program* which has been written to trace errors in other programs or to locate the cause of a machine breakdown.

Diagnostic test. Refers to the use of a special *program* so as to identify and isolate faults or sources of potential failure in the *hardware* of a computer. It is also known as diagnostic check.

DialogTM. An information data base retrieval service that provides specific information on many subjects of interest to businesses and individual users through computers. The service, operated by Lockheed Corporation, has over 200 data bases covering approximately 55 million records.

Differential Analyser. An *analog computer* employing connected *integrators* to solve differential equations.

Differential Gear. A device which has been used in mechanical *analog computers* in which two input variables and one output variable have been represented by angles of rotation of shafts. The output variable may be the *sum* or *difference* of the two input variables.

Differentiating Amplifier. A *computing amplifier* which is used in electronic *analog computers.*

Differentiator. A device which is used on *analog computers* and consists of one input variable and one output variable which is proportional to the differential of the input with respect to time.

Digital. Refers to the use of discrete signals for representing data in the form of numbers or characters. Most forms of *digital representation* in *data processing* has been done on the basis of *binary numbers*, sets of *binary digits* being grouped together to represent numbers in some other *radix* when required.

Digital/Analog Converter. A unit which is able to convert *digital* signals into a continuous electrical signal suitable for input to an *analog computer.*

Digital Clock. 1 A timing device which is able to control operations within a computer. 2. Also refers to a clock which records physical conditions and routine events that must be logged as part of the computer's operation.

Digital Computer. A computer that is able to process information expressed as combinations of data that are represented by separate, individual units (discrete data). Sequences of binary code, 0's and 1's, have been indicated within the computer as either the presence or absence of voltage (on or off). *Contrast with analog.*

Digital differential Analyser. A digital computing device having special circuits in-built to carry out the mathematical process of integration.

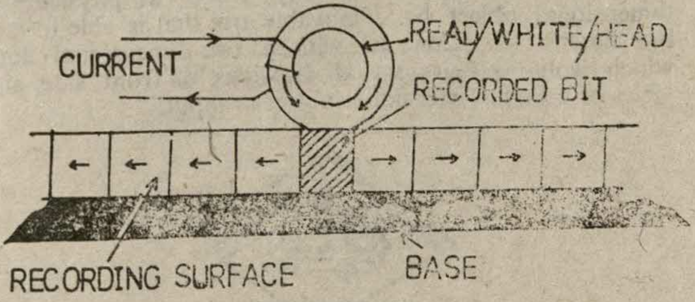
Digital Divider. A device used in *digital computers* which is used to accept signals representing a *dividend* and *divisor* and generates a *quotient* and *remainder*.

Digital Incremental Plotter. An *output device* able to accept signals which are transmitted from a computer and can plot graphs to show statistical trends and other graphical solutions to problems.

Digital Integrator. An integrating device in which digital signals represent increments in input variables x and y and an output variable z.

Digital Multiplier. A device which is used in *digital computers* to carry out *multiplication*. It is able to accept two signals representing the *multiplicand* and *multiplier* and generates the representation of their *product*.

Digital Recording. A technique for recording information as discrete points onto magnetic recording media, like magnetic tapes or disks.



Digital Recording

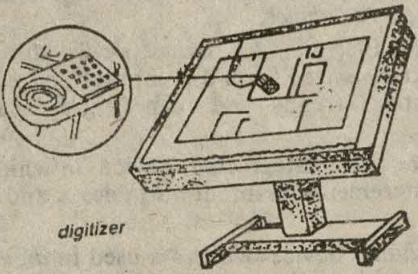
Digital Subtractor. A device which operates with digital *operands* to carry out the function of *subtraction*. It is capable of accepting two input signals representing numbers, and of generating an output signal representing their *difference*.

Digit Delay Device. A logic device which is used for delaying digit signals; *e.g.*, to achieve the effect of a *carry* from one digit position to another in arithmetic circuits.

Digit Emitter. On a *punched card tabulator* or *calculator* it refers to a device to emit signals at various points in the time cycle of the machine. The pulses emitted are able to initiate specified actions at corresponding moments during the machine cycle.

Digit Filter. A device which is used on *punched card* equipment for detecting the presence of a particular *designation* in a specified *card coloum.*

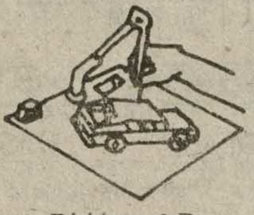
Digitizer Refers to a device that converts analog measurements, such as a drawing, into digital form for input into a digital computer. *See graphics tablet.*



digitizer

Digitizer, Cross Haired Cursor. A device which is used to position each point individually, relative to a system of coordinate axes, when inputting data with a digitizer.

Digitizer, Three-Dimensional. A digitizing device that inputs coordinate information directly from a physical three-dimensional object by a movable arm that is able to measure the dimensions. Contrast with a two-dimensional digitizer, which would require scaled drawings of front, side, and top views of a three-dimensional object as input.



Digitizer, 3-D

Digitizing Pad. A *tablet* which is uesd as an *input device* : freehand drawing could be converted into digital signals with a resulting image being shown on a *visual display unit.*

Digit Plane. The devices making up the *memory* of a computer are assembled in the form of a three-dimensional array. The term digit plane refers to the plane having elements for a particular *digit position*; *i e.*, the first digit of each *word* will appear in the same plane, the second digit in another and so on.

Digit Position. In *positional notation* it refers to the particular position of each digit in a number. The digit positions have been numbered from the lowest significant digit of the number.

For example, in a system using twelve-bit *binary representation*, the individual positions will be referenced as given below :

11 10 9 8 7 6 5 4 3 2 1 0

Digit Pulse. A pulse which is used to drive a number of memory elements, all corresponding to a particular *digit position* in a number of *words*.

Digit Selector. Refers to a selecting device on a *puncded card* machine which could be activated by *designations* punched into the cards thus calling for a particular series of operations to be carried out in accordance to the card type.

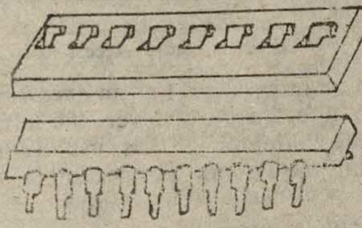
Digit Time. Refers to the time interval which corresponds to a specific digit signal in a series.

DIL. Acronym for *Dual In-Line package*. (*DIP* is a more usual acronym).

Diode. An electronic device which is composed of two elements; it allows the flow of current in one direction but inhibits the flow in the other direction. Used on chips.

DIP. Dual in-line Package (acronym, pronounce as one word).

DIP Switches. A small series of on-off switches on a dual-in-line package, enabling user selection of options on a circuit board without hardware alteration.



DIP Switch

Direct Access Storage. A *device* in which the mode of access is not *serial* as it is with *magnetic tape*.

Direct Coding. Program *instructions* which are written using the actual instruction codes and *addresses* employed in the computer's *machine code*.

Direct Control. A system in which one machine has been controlled by another master machine; *i.e*, the master machine exerts direct control over the other.

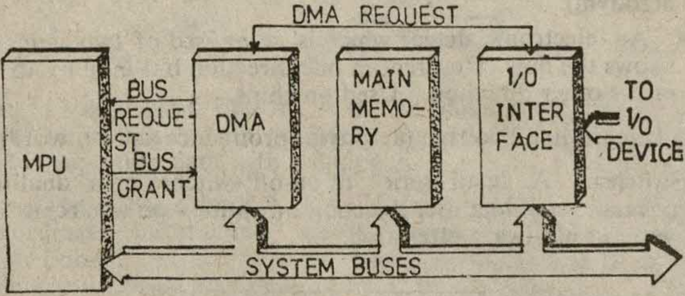
Direct Data Entry. Refers to the preparing *data* in such a way that conversion from a key stroke to a *magnetic medium* occurs without the intermediate process of, for example, creating a *punched card*.

Direct Display. A *visual display unit* which is able to display data in graphical or character from direct from *memory.*

Direct Instruction. Refers to any *instruction* which directly *addresses* an *operand* on which the specified *operation* is to be carried out.

Directive. A statement written as part of a *source program* to instruct or direct the *compiler* in carrying out the translation to *machine code.* A directive is not generally translated into *object program* instructions.

Direct Memory Access. (DMA). An input/output method that is able to allow direct transfer of data between a peripheral input/output device and memory without tying up the computer's central processor. This is a preferred technique for high speed mass storage devices such as magnetic disks or tape units. Special hardware components are needed for DMA.



Direct Memory Access

Director. Refers to an integral part of an *operating system* which is able to have direct control over the allocation of internal resources of the computer. It is usually responsible for the programs within the system. For example, control over *virtual machines.*

Directory. The list of all files, which is itself a file, on a computer storage medium for the user's easy reference. Also catalog.

Dirigible Linkage. A system of mechanical connectors which are used in mechanical *analog computers* as part of multiplication and division units.

Discrete. Refers to separate, unconnected, distinct parts.

Disk Crash. Failure of a disk, thereby causing the system to malfunction, usually due to destructive contact between the read/write head of the disk drive, and the surface of the disk.

Disk Drive. A device that is able to rotate magnetic disks and access its data by means of a read/write head. Disk drives are operated by disk drive controllers and utilize the principle of random access storage.

Diskette. *See floppy disk (also disc).*

Disk File. A file that resides on a magnetic disk.

Disk, Magnetic. Refers to a flat, circular storage medium which is capable of storing digital information. It is organized into a hierarchy of tracks and sectors, allowing information to be read or written via random access. *See floppy disk, sectors, tracks.*

Disk Operating System. (DOS). An operating system using disks for its secondary storage medium. Typically, it is able to regulate space allocation, keep track of files, save and retrieve files, and manage other control functions associated with disk storage.

Disk Pack. *See hard disk pack.*

Disk System. All the components which are required for disk storage, including the disk, disk drive, read/write heads, control electronics, and software.

Dispersed Intelligence. Describes any system in which programmable processing units (perhaps operated by *microprograms)* are used to carry out *application* or *system control* functions remote from the *main frame.* The remote units are connected to the main frame which carries out the major central application functions.

Display. An output device which is used for the temporary storage and presentation of graphic and/or alphanumeric data for the purpose of visual examination by the user. The cathode ray tube (CRT), light emitting diode (LED), and liquid crystal display (LCD) represent display technologies.

Display Buffer Memory. Refers to the number of characters that can be held in storage for immediate display on the screen.

Display Control. An *interface* unit which is used to connect a number of *visual display units* to a *central processor.*

Display Highlighting. Refers to the way text has been emphasized on the screen, using such enhancers as reverse video, underline, blinking, bold, low contrast, and high contrast.

Display RAM. A RAM area of memory separate from main memory, which stores information to be shown on a video display. The information is not kept in memory once the power has been turned off.

Distributed Computing. Refers to the organization of processing in such a manner that a number of independent computers or *intelligent terminals* can cooperate in exchanging data over a *network.*

Dithering. With a color display : using a combination of juxtaposed different-colored dots, which in combination will create the illusion of yet another single color. With a black and white display: juxtaposing black dots and white dots in varying ratios so that groups of these dots will create the illusion of a grey scale tone.

DMA. Direct Memory Access (acronym, pronounce letters individually).

Document. Any form or voucher containing details of some *transaction*.

Documentation. Refers to the set of instructions that accompanies software and hardware to explain their use. Usually in manual form or for display on the CRT screen.

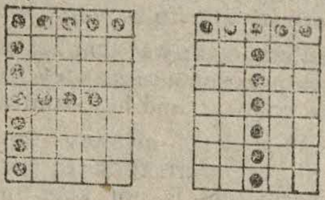
Docuterm. A *data-name* which is used to designate a *data element* and to indicate the content of that element. It is mainly assigned to assist in subsequent *retrieval*.

Do-Loop. A command in the FORTRAN language that causes a program segment to be executed repeatedly, with values substituted, until certain conditions are satisfied. It then proceeds to the sequence immediately following the loop.

Do Nothing Instruction. An *instruction* which performs no action duriag the operation of a *program*. It is sometimes to allow for future changes to the program but more often used to cemplete a set of instructions where the *machine code* system needs instructions to be written in complete groups.

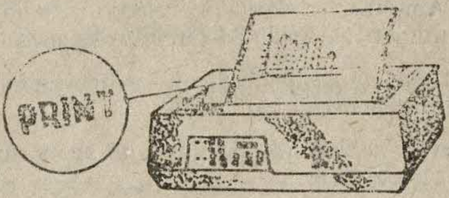
DOS. Disk Operating System (acronym, pronounce as one word).

Dot Matrix. Refers to a technique for forming characters by composing them out of selected dots from within a square or rectangular grid pattern of dots (matrix). Common dot matrix sizes for displays and printers are 5 × 7 dots or 7 × 9 dots, but greater numbers of dots can be used for increasing visual clarity (resolution) of the characters.



Dot Ma'rix Character
Representation

Dot Matrix Printer. Refers to a printer with several tiny projecting wires or needles that combine to form dotted representations of individual characters within a matrix Dot matrix printers possess poorer image quality than letter quality printers, but type faster and are some what cheaper.



Dot Matrix Printer

Double Buffering. Means the use of two areas of *memory* as *buffer stores* during *input/output* operations which involve a particular *peripheral unit.*

Double Density. Refers to a technique used to increase bit density on a magnetic storage medium to twice the amount of single density so that more information can be stored in the same amount of area.

Double-Length Number. A number which is stored in two *words* in *memory* for use in *double-precision arithmetic.*

Double Precision Arithmetic. Arithmetic in which the accuracy has been doubled by employing twice as many bits (two words) for representing a number. The larger word size implies that the computer can handle numbers with more significant figures, enabling greater precision. *See word size, significant figures.*

Double-Precision Hardware. Special arithmetic units which are designed to allow greater accuracy in airthmetic results, by permitting a *programmer* to carry out arithmetic operations using *double-length numbers* as *operands.*

Double-Pulse Reading. Refers to a technique for recording *binary digits* in a *magentic cell,* in which each cell incorporates two regions which can be magnetized in opposite directions.

Double Punching A term which is used to describe the condition where two holes appeared in the same *card column* of a *punched card.*

Double Sides Disk. A megnetic disk which is capable of storing information on both of its surfaces

Double Tape Mark. A physical indicator which consists of two *tape marks* used to indicate the end of a *volume* or *file.*

Download. Refers to transfer programs and/or data files from a computer to another device or computer.

Down Time. Refers to time during which a computer is not functional due to mechanical failure or electronic problems. It usually refers to the whole computer system being inoperative, rather than just one problem area.

DP. Data Processing (acronym, pronounce letters individually).

Drift-Corrected Amplifier. A device used in *analog computers*—a type of amplifier that includes circuits designed to reduce *drift*.

Drift Error. In *analog computers*, an error which is incurred in a computing device because of *drift*.

Drive. Any device which physically transports some recording medium, *e.g*, a *disk drive*.

Drive Pulse. In a *core store*, it refers to a pulse which is applied to a storage element to induce a corresponding magnetizing force.

Driver. Small programs used to control external devices or to run other programs. Driver software directs production, manipulation, and presentation of appropriate signals by the processor so that, at the correct movement, the peripheral device will perform as required.

Drop. Refers to a remote terminal location within a terminal network.

Drop Dead Halt Refers to a halt from which there occurs no recovery. *See dead halt, halt.*

Drop-in Refers to the accidental generation of unwanted *bits* during *reading* from or *writing* to a magnetic *storage device*. Contrasted with *drop-out*.

Drop-out. A failure when *reading* or *writing* to a magnetic *storage device*. A loss of digits due to some fault condition during a *reading* or *writing* operation.

Drum Mark. A special *character* which is used to signify the termination of a group of characters on a recording *track* of a *magnetic drum*.

Dry Running. Means checking the logic and coding of a *program* from a *flowchart* and written *instructions*, using paper for recording the results of each step of the operation before actually running the program on the computer.

DSK. Dvorak Simplified Keyboard (acronym, pronounce letters individually). *See Dvorak Keyboard.*

DTE. Data Terminal Equipment (acronym, pronounce letters individually).

Dual Channel Controller. Refers to a controller that enables reading from—and writing to—a device to occur simultaneously.

Dual Disk Drive. A floppy disk system with two drive mechanisms and recording heads, which allows increased storage capacity and disk-to-disk data transfer and back-up.

Dual in-Line Package (DIP). A standard integrated circuit which is enclosed in a molded plastic container. It consists of two parallel rows of pins that connect to the circuit board These circuits born the basic building block of integrated circuit boards.

Dual Intensity. Refers to the capability of some printers and display devices to reproduce symbols in both regular and boldface formats.

Dual Mode Printer. *See printer, dual mode.*

Dual Operation. A *Boolean operation* whose *truth tabl* can be obtained from another operation by reversing the value of each element in the table is said to be a dual operation to the other, *e.g.*, the *or operation* is dual to the *and operation*.

Dual Processors. A computer using two processors, the second of which could be a back-up either to perform additional functions, or to aid in the use of an auxiliary operating system.

Dual Recording. In a system which needs to provide *security* and *resilience* to *failure*, two copies of *master files* are made by updating them at the same time as transactions are received. This method should not be confused with the method of copying master files at intervals in a job.

Ducol Punched Card System. Refers to a system in which numbers in the range 0 to 99 were punched as two holes in the *lower curtate* of a single *card column*. The absence of *overpunching* means that the higher value digit was the tens digit, whereas the presence of 10 (Y) overpunching means that the lower value digit was the tens digit. An 11 (X) overpunching is used to denote that a single hole is to be treated as two digits, *e.g.*, 33, 22, 55, etc.

Dumb (Terminal or Modem) Refers to a terminal that does not have a microprocessor to control various terminal tasks In contrast, an intelligent terminal might allow word processing functions to be done utilizing the power of the terminal and not the CPU. A dumb terminal would not have this capability. *See smart terminal.*

Dummy. Refers to any feature which is included in a *routine* to satisfy some logical or structural requirement, but which in a particular circumstance is not used.

Dummy Variable. It is used as an argument for a function or subroutine and whose purpose is to transfer the data from the main program to the function or subroutine.

Dump. To display, print, or store the contents of the computer's memory.

Dump and Restart. If a computer *run* gets terminated at a point earlier than its completion (because of a machine failure, for example) dump and restart techniques ensure that the run can be restarted without the need to go back to the begining.

Dump Check. Refers to a check performed to verify the accuracy of a *dump*; *e.g.*, by creating *control totals* and/or *hash totals* during *dumping* and to check these totals when the data re entered into *memory*.

Dump Cracking. Used for describing the job performance by programmers or engineers in diagnosing faults in *application programs* or in *systems management software*.

Dump Point. Refers to a point in a *programe* at which it is advisable to *write* the program and its data to a *backing store*, as a safeguard against machine failure.

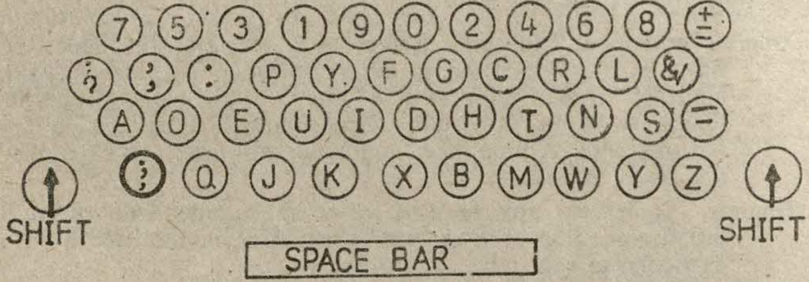
Duplex. Refers to a method of communicating between two devices that permits data transfer in both directions simultaneously. *See half duplex*, *full duplex*.

Duplex Channel. A *channel* which is allowing simultaneous transmission in both directions.

Duplex Computer System. An *on-line* configuration in which two computer systems are used, one acting as a standby to safeguard against the failure of the other.

Duplex Console. In *on-line* computer systems, it refers to a *console* which can be switched for controlling two computers so that one or the other may be connected on line.

Duplication Check. A check that needs a particular calculation to be carried out twice, using a different method on each occasion, the two *results* being compared. A form of *arithmatic check*.



Dvorak keyboard

Dvorak Keyboard. A keyboard arrangement which is easier and faster to use than the standard QWERTY keyboard. *See QWERTY keyboard.*

Dyadic Boolean Operation. Refers to a *Boolean operation* where the result has been determined by the *bit patterns* of two *operands* and the *truth table* of the *operator*.

Dynamic Allocation. Refers to a method which is adopted on *multiprogramming* computers for assigning *main store* and *peripheral units* to a *program*. Usually carried out under control of an *executive program*, and designed to allow complete flexibility in the *loading* of programs dependent upon the peripherals and storage available at any one time.

Dynamic Allocation (of Memory). Refers to the system which is used in *multiprogramming* whereby an *executive program* allocates areas of *memory* to a *program* as and when the program gets loaded. In such a system several programs may be operating in memory at the same time.

Dynamic Buffering. A technique used in handling message which are entering a system or process in which message may be of variable length and frequency. The *storage* area allocated as a buffer to receive messages has been extended or contracted by adding or removing units of storage while messages are arriving.

Dynamic Check. Refers to a check carried out on the operation of an *analog* device and on the *set-up* of a problem, by comparing results obtained in the *compute mode* with some previously computed values.

Dynamic Dump. A *dump* which is carried out during the execution of a *program*.

Dynamic Error. An error incurred in a *analog* device which results from an inadequate frequency response of the equipment.

Dynamicizer. A *logic element* which is able to convert a set of *digits* represented by the spatial arrangement of *bits* in *store* into a sequence of signals occurring in time.

Dynamic Memory. A *regenerative store* in which information gets retained by a continually circulating signal (*delay line store*).

Dynamic Memory Relocation. Pertaining to a characteristic of *multiprogramming* computers, in which *memory* areas are automatically allocated and re-allocated to *programs* as and when any program has been *loaded* or deleted from memory.

Dynamic Printout. Means a situation in which a computer program directly creates its printed output. Because of the greatly disparate speeds of the computer processing unit and the printer, this situation is usually not preferred. In some computers, a buffer enables the printing to take place without limiting the CPU speed. *See spooling*.

Dynamic RAM. Means a type of MOS memory circuit that needs continual refreshing (internal regeneration of its contents). The advantages are higher density and speed as compared to static RAM; however, additional refresh circuits are necessary.

Dynamic Stop. Refers to the use of a *branch instruction* for creating a *program loop* which is in turn used to signify an error condition.

Dynaturtle In the logo language, it refers to a dynamic cursor instead of a static one. The cursor is referred to as a turtle, which is used to produce graphics. Commands to a dynaturtle specify a change in velocity and acceleration during the creation of a drawing. The path of the turtle becomes a line in the drawing.

E

E 13 B. A type fount which is used for *character recognition machines.*

EAM. Abbreviation of *electrical accounting machines.*

EAROM. An acronym for *Electrically Alterable Read Only Memory,* a class of *read only memory* to which it is possible to write information at any time using special circuits

EBCDIC. A *data communication* code in which 8 *information bits* have been used to form 256 unique *character codes.* Compare with *ASCII*, an *ISO* code which uses 7 information bits plus a *parity bit.*

EBR. Abbreviation of *electron beam recording.*

Echo. The return of a transmitted signal back to its source, with a delay that indicates the signal is a reflection rather than the original.

Echo Check. Refers to a method for checking the accuracy of a transmission by reflecting the transmitted data back to its source for comparison. If the data is sent from a display, it goes first to the receiver and then it shows up afterward on the display screen for verification.

ECL. Abbreviation of *emitter coupled logic.*

ECMA. Acronym for European Computer Manufacturer's Association. It is a body which has influenced standards concerned the use of computers and their ability to interchange information.

Econometrics. Applying the techniques of the empirical sciences so as to establish significant relationships in economic and statistical data, and to use these relationships as a basis for predictions. The use of computers in econometrics lies mainly in their ability for analysing large volumes of data, and also for constructing and testing economic and *mathematical models*

Edge Card Connector. Refers to a unit that connects printed circuit cards to a motherboard or to other devices, such as an input/output device hooked up through cables.

Edge Notched Card. A card having holes in one or more edges used in a simple mechanical search technique : each hole position was assigned a coded significance and for particular cards the holes were turned into notches by removing the part of the card between hole and edge. Particular cards could then be mechanically selected by the insertion of a long needle in a hole position and the raising of the card *pack* to allow notched cards to remain unraised while unwanted cards remained in the main pack on the needle.

Edit. Refers to arrange data into the format which is required for subsequent processing. Editing may involve deletion of data not required, conversion of *fields* to a machine format (*e g.*, *value fields* converted to *binary*) and preparation of data for subsequent output, *e.g.*, *zero suppression.*

Editor. A computer *program* which is used to assist a human operator to prepare text or data for entry to (or output from) a computer system, or to retrieve and rearrange data previously stored in a computer *file.*

EDP. Electronic Data Processing (acronym, pronounce letters individually).

EDS. Acronym for *Exchangeable Disk Store.*

EEPROM. Acronym for Electrically Erasable Programmable Read-Only Memory. *See PROM.*

Effective Address. An *address* which is actually used by the computer for executing an *instruction*, as opposed to the address written in the *program.*

Effective Instruction. The *instruction* which is carried out as the result of altering a *basic instruction* during *program modification.*

Effective Memory Address. Any *memory address* computed by information provided in a *program instruction*; *i.e.*, the computation has to take place before the instruction can be executed.

Effective Time. Refers to the time during which a computer is being used for work which produces useful results. It includes *productive time*, *program development time* and time used for demonstrations, training, *house-keeping*, etc. (*incidental time*).

Eight Bit. Refers to word size. *See microprocessor, 8-bit; microcomputer. 8-bit.*

Eighty-Column Card. A *punched card* having eighty vertical *card columns.*

Elapsed Time. Refers to the total apparent time taken by a process, as measured by the time between the apparent beginning and the apparent end of the process. This may well be longer than the actual time taken by the process itself.

Electrical Accounting Machine. Any electro-mechanical device which finds use in *data processing*, other than computer equipment. The term includes *tabulators*, *calculators*, *balancers*, etc.

Electron Beam Recording. Refers to a method of utilizing an electron beam to write computer-generated data direct to a recording surface.

Electronic Bulletin Board. An electronic call-up service that lets users compose and store messages to be retrieved by other users.

Electronic Calculating Punch. A device which is able to read data from a *punched card,* carry out a sequence of arithmetic calculations on the data and punch the result into another punched card.

Electronic Data Processing. *Data processing* carried out by *electronic* machines; the methods and techniques which are associated with such processing.

Electronic Data Processing Machine. Any machine or device used in *data processing* which uses *electronic* circuitry either wholly or mainly so as to carry out arithmetic and logical operations.

Electronic Differential Analyser. An *analog computer* which is designed for solving differential equations.

Electronic Mail. Messages which are sent by one user and retrieved by another through an electronic service system, usually through telephone lines or radio transmission. Each user must know the other's identification number. The mail service is instantaneous.

Electronic Mail. Refers to the use of a *mailbox* facility for storing, forwarding and accessing messages electronically.

Electronic Spreadsheet. Software that simulates a business or scientific worksheet in which the user can indicate data relationships. If data are changed, the program has the ability to instantly recalculate any related factors and to save all the information in memory; examples are VisiCalc^{TM} and SuperCalc^{TM}.

Electronic Switch. A *switch* which makes use of an *electronic* circuit, enabling the switching action to take place at high speed.

Electrostatic Printer. A small-format, nonimpact printer that forms characters by putting an electrostatic charge on the character outline, dusting the paper with dry ink, and then melting the ink to form a bond with the paper.

Electrostatic Storage. A *storage device* using the presence of an electrostatic charge to represent data, *e.g.*, the surface of a *cathode ray tube.*

Element. A member of a collection of items which cannot itself be subdivided into any constituent parts which may themselves be regarded as members of the collection, *e.g.*, the elements of a computer *word* are *bits*, where as the elements of a *record* may be *words*

Elementary Item. A *COBOL* expression for an item of data which does not have subsidiary items.

Embedded Command. In word processing, one or more characters inserted into the text, which do not print but instruct either the printer or the word processing program to carry out a task; for example, go to half spacing, end the page, etc.

Emitter. Refers to a device in *punched card* machines for generating signals so as to simulate the presence of holes not actually punched.

Emitter-Coupled Logic. A form of electronic *logic*. It is described as non-saturated logic, because the transistor components within the *integrated circuits* operate effectively without being switched fully on or fully off. Due to this quality they find use with very high frequency signals and are capable of very fast speeds of operation. A standard ECL device may operate at around 100 MHz while some specialized ECL devices can operate at 1000 MHz.

Emitter Pulse. One of a set of *pulses* which, in *punched card equipment*, defined a particular *row* within the *columns* of a card.

Empty Medium. A *medium* prepared to accept information by having some preliminary data recorded in it, *e.g.*, *sector boundaries* in *floppy disks*, *magnetic tape* with *header labels* already written.

Emulation. Refers to the process of using a computer to operate on data and code produced for a different computer type; special *hardware* and *software* are used to represent the computer for which the work was originally implemented.

Emulate. To imitate one system with another system so that the imitation system is perceived to be the same as the original. The modification that takes place affects the hardware, not the software that will be run.

Emulator, Software. Software that gives one computer system (computer B) the ability to execute programs originally written for another computer system (computer A) without changing the hardware or reprogramming the programs that were written for computer A. The program acts on Computer B, not on the other programs to be used. However, as the computer must look up the corresponding machine language each time an instruction appears, the resulting runs take longer than normal runs. *See emulate*.

Enable-Interrupt. It refers to a process in which a *sequence* of *instructions* is under taken as an unscheduled *event* caused by a device external to the computer. The event arises in such a way that it could not be predicted by the main *program* operating within the computer.

Enable Pulse. A *digit pulse* which together with a *write pulse* is sufficiently strong to change the state of a *storage element*, but which is not of sufficient strength to do so on its own.

Enabling Signal. A *signal* allowing an *operation* already set up to take place.

Encode. To represent data in digital form as a series of impulses denoting *characters* or *symbols*. To facilitate *automatic processing* by the arrangement of facts into a coded form suitable for subsequent processing.

Encoder. A device that substitutes one set of symbols for another.

End-Directive. A *statement* in an *assembly program* which simply informs the assembler that no further *instructions* are to be assembled or *executed* in the program.

End Mark. A *code* which is used to signal that the end of an item of information has been reached.

End of Data Marker. A *character* or *code* indicating that the end of all data held on a particular *starage unit* (*e.g.*, a *reel* of *megnetic tape*) has been reached.

End of Field Marker. An additional *data element* indicating that the end of a *field* (usually a *variable length* field) has been reached. Also known as *flag*.

End of File (EOF). A marker that indicates the end of a file.

End of File Marker. Refers to a *marker* which can be recognized by *hardware* as well as *software*, which reveals that the end of a *file* has been reached.

End of-Job Card. A *punched card* (placed at the end of a *pack* or cards used as input to a *job*) which informs the *program* that the job has been completed and usually initiates some form of further action such as starting the next job.

End-of-Message. A *character* or *code* indicating that the end of a message has been reached.

End of Page Indicator. A feature that halts the printer at the end of each completed page of output to allow the user to handle paper, ribbon, or font changes manually.

End of Record Word. A *word* terminating a *record*, usually in a special format so that the end of the record could be identified.

End of Run. The completion of a *program* or programs forming a *run*, usually signalled by a *message* or *indicator* from the program.

End of Run Routine. A *routine* which is provided by the programmer to deal with various *housekeeping* operations before a *run* gets terminated, *e g. rewinding* tapes, printing *control totals*.

End of Tape Marker. A *tape mark* indicating the physical end of a *reel* of *magnetic tape*, usually by means of a strip of reflective material attached to the tape. It is also known as destination warning marker.

End of Transmission (EOT). A signal indicating that the end of the data transmission has been reached.

End Printing. A type of *interpreting* of data on *punched cards* in which the printing occurred across the end of the card.

End Value. A value that is used for comparison with a count, index, etc., to see if a certain condition has been met.

Endwise Feed. A *card feed* which is designed to accept *punched cards* kept in the *hopper* so that one of the ends of the card ntered the *card track* first.

Enter. Often used interchangeably with Carriage Return.

Entry. 1 Refers to the *address* of the first *instruction* in a *program* to be obeyed; also the first instruction of a *subroutine*. 2. Also refers to a unit of information, either *input* or *output* ; an item of data in a list or table.

Entry Block. Part of *store* into which an *entry* or unit of information is left on *input*.

Entry Condition. A condition which must be specified before a *program* or a *routine* has been entered.

Entry Instruction The *instruction* obeyed when *entry* is first made to a *routine*. Some rountines may be having several *entry points*, and depending upon conditions at the time of entry one of these points will be entered.

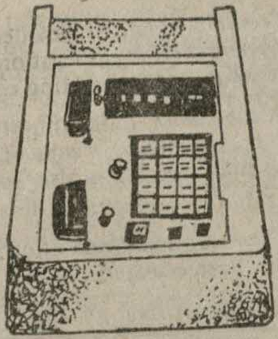
EOF. End Of File (acronym, pronounce letters individually).

EOM. End Of Message (acronym, pronounce letters individually).

EOT. End Of Transmission (acronym, pronounce letters individually).

EPROM. Erasable Programmable Read Only Memory (acronym, pronounce first letter individually, rest as one word). A programmable memory which can only be read, and normally not changed or written into—as opposed to RAM. However, there is a method by which the chip can be reprogrammed. Using special hardware, an EPROM could be erased with ultraviolet light and reprogrammed.

EPROM Programmer. A special device used to program EPROM chips.



Eprom Programmer

Epson. A manufacturer of dot matrix printers and other microcomputer products.

Equality Unit. A device which is able to accept as *input* two numbers and generate an *output signal* of 1 if these numbers are equal and 0 if they are not equal.

Equal Zero Indicator. An *indicator* which is set when the result of a calculation or test is zero, and which could be tested by a *branch instruction*.

Equate Assembler Directive. A *directive* used in an *assembly language* which provides an instruction to the assembler to substitute a particular number each time it finds a specified *label* used as a *mnemonic operand*.

Equate Directive. Any *command* which is written into a language system to provide a programmer with a facility to assign a value to a *symbolic name*.

Equipment Compatibility. Refers to the situation which *programs* and data are interchangeable between different types of equipment.

Epuipment Failure. Any *hardware* fault that prevents the completion of a job.

Equivalence Element. Refers to *logic element* in which the relationship between two *binary input signals* is defined by the *equivalence operation*. In effect, the element produces an output signal of 1 when the two input signals are the same and 0 when they differ. It is also known as equivalent-to element, coincedence element.

Equivalence Operation. A *Boolean operation* on two *operands* (p and q), the *result* (r) being given by the table below.

Operands		*Result*
p	*q*	*r*
1	1	1
1	0	0
0	1	0
0	0	1

Equivalent Binary Digit. Refers to the number of *bits* which are necessary to represent each member of a set of characteristics by a unique *binary number e.g*, in order to represent each letter of the alphabet (*i.e.*, 26 elements) five bits are necessary, since, 26, in binary notation is 11010.

Erasable Storage. A medium of *store* which can be used repeatedly since new information *overwrites* or erases information previously occupying its *location*. Examples are *magnetic tape* EEPROM.

Erase. Refers to the replacing of *data* in a medium of *store* with some uniform code representing null data. This may be zeros or space characters, or some suitable code.

Erase Head. The device on a *tape transport* which is able to erase data before new data is written to the tape.

Ergonomics. Refers to the study of the relationship between the efficiency and comfort involved in human performance when using machines. Also called human factors.

Error. Any condition in which the expected results of an operation are not achieved. Errors are of two main types, *software* or *program* errors and *hardware* errors. The former are errors in the writing or specification of programs and system, and the latter arise by the malfunctioning of equipment.

Error Checking Code. A general term used for all *error detecting codes* and *error correcting codes.*

Error Code. The identification of a particular *error* by means of a *charactor* or *code.*

Error Correcting Code. An *error detecting code* which is designed so that it is in some cases possible to recognize not only that an error has occurred, but also what the correct code should have been.

Error Correcting Routine. A *routine* which is designed to detect and correct errors on *files* of data.

Error Detecting Code. A *code* in which the representation of each *character* is constructed in accordance to specifie rules.

Error Detection Routine. A *routine* which is designed to check data items for validity and to detect errors *validity checking.*

Error Diagnostics. Refers to the checking of *source language statements* for errors during *compilation* and the printing of error messages identifying the errors made.

Error Interrupts. An *interrupt* taking place as a result of a *program* or *hardware* error, *e.g.*, causing the message to be printed indicating the error condition and the *suspension* of the program in which the error has occurred.

Error Message. A *message* output by *program* which indicates the incidence and type of *error* which has occurred.

Error Rate. In *data transmission*, it refers to the ratio of the total number of transmission *errors* to the total volume of data transmitted *e.g.*, one *bit* in 10^7 bits.

Error Register. Refers to a special *storage location* whose individual *bit* positions are set if an error condition arises.

Error Report. A list of error conditions which are caused during the execution of particular *program*; *e.g.*, errors caused by incorrect or unmatched data.

Error Reset. Refers to an operation which is under taken to reset an error *flag* in an *error register* after an error condition has been detected and corrected.

Error Tape. A *magnetic tape* onto which *errors* have been written for subsequent listing and analysis.

Escape. (ESC). A non-printed character which is used by the terminal and/or host computer, typically in conjunction with another character, to perform a specific function. For example, "ESC" plus "Y" might tell the terminal that the user is going to move the cursor.

ETB. End of Transmission Block (acronym, pronounce letters individually).

EthernetTM. A local area network (LAN) system which was developed by Xerox Corporation. Its goal is to become a standard for such applications as office automation and distributed processing.

ETX. End of Text (acronym, pronounce letters individually).

ETX/ACK Protocol. End of Text/Acknowledge (acronym, pronounce first three letters individually, rest as one word). A procedure which is used in communications to verify transmission.

Even Parity Check. Refers to a *parity check* in which the number of ones (or zeros) in a group of *binary digits* is expected to be even. Contrasted with *odd parity check.*

Event. A processing action or occurrence that alters data files.

Event Counter. A *logical* device which is able to monitor regular events taking place within a computer to maintain a count of such events. The event counter can be examined by a *program* and used for *control* purposes; *e.g*., *clock pulses* known to occur at fixed time intervals can be counted to generate precise timing intervals in a *control* program.

Event Sequence Timing Diagram. A line diagram which deals with *signal* levels and *transitions*. It is used by *logic* designers to show the conceptual relationships between signals within a computer system.

Exception Principle System. A system that reports only those results that are different from predesignated results or criteria.

Exception Reporting. A record that contains only certain types of results, such as changes, values that do not match preset criteria, or values that exceed previously indicated limits.

Exchangeable Disk Store. Refers to a *backing store* device in which *magnatic disks* are loaded into a *disk transport* mechanism as a unit; *e g*., as a capsule having say six disks. A capsule can be replaced by an operator during operation of the computer and individual capsules having particular *files* can be retained in a *library* until required for use with a particular *program* or *suite* of programs.

Exchange Instruction. Refers to an *instruction* which is found in some *assambly language* systems. It is used where it is required to interchange the *operands* of two *registers* (*e.g*.; the contants of register X are placed in register Y and vice versa),

Exclusive-or Operation. A *logical operation* which is applicable to two *operands*. which will produce a result depending on the *bit patterns* of the operands and in accordance to the following rules for each bit position.

Operands		*Result*
p	*q*	*r*
0	0	0
1	0	1
0	1	1
1	1	0

For example, operating on the following 6-bit operands

p=110110
q=011010

r=101100

Executable. Can be processed, or executed, by the computer without need for translation.

Execute. To interpret a programmed instruction and perform the indicated operation or operations.

Execute Phase. That part of a *control cycle* in which an *instruction*, have been *accessed*, is undertaken. Usually an instruction is handled in two *machine* cycles : the instruction is loaded into a special *register*, and it is then *executed.*

Execution. The *execution* of a *program* takes place when its compiled *object code* is run in the computer to perform its intended *application* function.

Execution Time. The portion of an instruction cycle during which the actual work is performed, or the operation is executed; for example, the time required to decode and perform an instruction.

Executive Program. It usually consists of a number of complex *routines* which are residing wholly or partly in the *main memory* of a computer so as to monitor and supervise certain basic control functions.

Exit. Refers to the last *instruction* in a *routine* or *program*, usually a *branch* from the routine into another part of the program or into a control routine.

Expander Boards. Boards that interface to the system and allow the user to add more circuitry for system expansion.

Expansion Slots. Slots for additional circuit boards which are found inside the main computer housing They can be used to expand the capabilities of the system through addition of peripheral devices. A board may in itself provide the increased capability (such as a 16K RAM board), or, if a new device is added to the system, a control board is kept in an expansion slot to drive the added unit.

Extended Basic Mode. *Basic mode* is a class of *interactive* processing between a *terminal* and its *main frame* processor. Extended basic mode provides additional functions which allow the basic mode and the transfer of bulk data.

Extended Precision Arithmetic. An operation that yields an answer which is more accurate (with more significant figures) than double precision arithmetic.

External Computer. A computer which is connected to a public information source such as a *videotex* network for giving a particular service to a *closed user group* or the general public via a *gateway*.

External Delays Time. External delays time is time lost because of circumstances outside the reasonable control of the user or manufacturer, *e.g.*, power failure.

External Device A *peripheral unit* which is attached to a computer via an *input/output port* or a *communications channel*.

External Logic. Logic *circuits* which are residing outside the boundary of a central computer system (*e.g.*, a *minicomputer* or *microcomputer*) and are within an *external device*. The input/output central logic within the computer has to *interface* with the external logic for ensuring the accurate transfer of data between the two devices.

External Store. Means a *backing store* which is under the control of, but not necessarily permanently connected to, a *central processor*, and which is able to hold data or *programs* in a form acceptable to it, *e.g.*, *magnetic tape* or *floppy disk*.
It is also known us as external memory.

Extract. To remove a selected part from an item or set of items of information.

Extract Instruction. An *instruction* which will place selected parts of an item of information into a specified *location*.

F

Face. Of a *punched card*, that side which bears the printing : synonymous with *card face*.

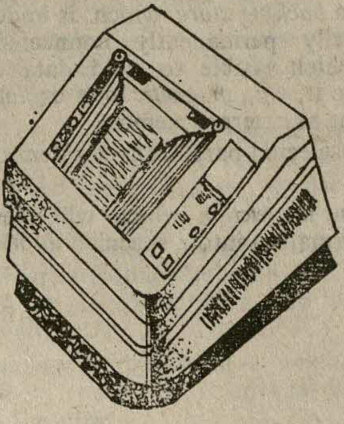
Face Down Feed. Refers to the attitude in which a *punched card* was kept in a *hopper* and moved along a *card track*; the *care face* of a punched card was that side which bears the printing.

Face up Feed. Refers to the attitude in which a *punched card* was kept in a *hopper* and moved along a *card track*; the *card face* of a punched card was that side which bears the printing.

Facsimile. Refers to a process that involves the electronic transmission of images, usually from one system to a remote receiving station. Images are electronically scanned, converted into transmission signals, and then sent to the receiving station. These signals are then converted at the receiving station for creating a duplicate of the original image.

Facsimile Telegraph. A telegraph system which is used for the transmission of pictures, maps, diagrams, etc.

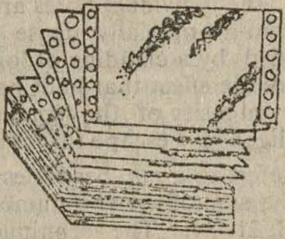
Facsimile Transceiver. A device used to implement facsimile production and transmission.



Facsimile Transceiver

Factor. A *data element* which is one of the *operands* in an *arithmetical operation.*

Fan Fold Paper. Continuous sheets of paper connected with perforations, folded in an accordion fold and used with a printer to provide a continuous feed without operator assistance. Also called Z-fold.



Fan Fold Paper

Fault Time. Same as down time.

Fault Tolerant. A system or program which is capable of correct operation despite a component failure.

FDC. Floppy Disk Controller (acronym, pronounce letters individually).

Feed. To cause data to be entered into a computer for processing; a device for so doing.

Feedback. (1) A response by the system to an input; (2) Use of an output as input to either the same or another process.

Feed Holes. Holes which are punched in paper or card to enable it to be driven by sprockets The holes had no significance in themselves but were also sometimes used for indexing in.

Feed Pitch. Refers to the distance between *feed holes.*

Feed Track. That *track* of a *paper tape* which has the *feed holes.*

Femto. Prefix denoting one thousand million-millionth or 10^{-15}.

FEP. An acronym for *Front-End Processor.*

Ferrite Core. A small piece of ring-shaped magnetic material which is capable of receiving and holding and electromagnetic charge. It is used in *core store.* Now it is obsolete, having been replaced by *silicon chips.*

Fetch. To retrieve data or instructions from storage.

Fetch Cycle. Many computers undertake *program instructions* in an *operation* which consists of two cycles. On the first cycle, an individual program instruction is fetched from *memory* and kept into a special *register* within the *central processing unit* or *microprocessor.* In the second cycle, the instruction is analysed and undertaken. These are generally known as the fetch cycle and the *execute cycle.*

Fibre Optical Transmission. *Glass fibres* provide a *transmission* medium for *data* in which extremely wide *bandwidths* are possible, thus permitting very high speed transmission of data and for the *multiplexing* of thousands of separate data *channels* onto one single glass fibre of small diameter. The fibre system works by guiding light waves at extremely high frequencies along the fibre. The individual fibres are constructed of frequencies which present an optically dense core of high refractive index surrounded by a cladding of low refractive index. This structure creates the effect that light has been guided along the fibre and the intensity of the *signal* decays only gradually as, little by little, light rays escape through the cladding.

Fibonacci Series. Refers to a number series in which each number is equal to the sum of the two numbers which precede it, *i.e.*, 1, 2, 3, 5, 8, 13, 21, 34. The technique sometimes finds use in computing to group records into *sequence* by key number, and the technique can then be used for an efficient search of the record set by dichotomy.

Field. An area within a record that stores a particular type of data (such as social security numbers, names, addresses, ages, etc.). *See data base.*

CUSTOMER NO.1 RECORD

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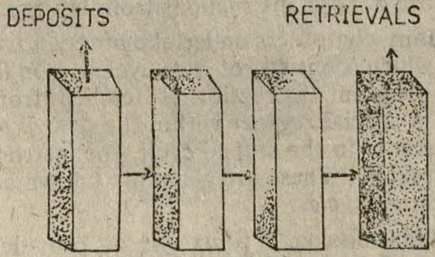
Fields

Field Identification. Refers to the method which is used to identify sub-elements of a unit of data when it becomes necessary to examine the data using software.

Field Length Refers to the size of a *field*, in terms of the units in which the *record* is composed, *e.g.*, on a *magnetic tape* record the field length may be measured in *characters* or *words*.

Field Protection. A technique which is used in *data entry* or *on-line data collection* systems to limit the positions on a *visual display unit* into which a user may enter data.

FIFO Queue. First In First Out structure (acronym, pronounce as one word). The first data item deposited in a queue of data items is the first one which is to be reached in processing.



FIFO Queue

Fifth Generation. Refering to work done to devolop computers which are intended to be addressed in a natural language and exhibiting *artificial intelligence.* A fifth generation programme was started in the UK as the *Alvey* programme in the early 1980s.

File. A group of organized data (records) which are assembled for one particular purpose and considered as one unit. It is stored in permanent off-line storage like a disk drive, tape, or disk.

File Activity Ratio. Defined as the number of retrievals or transactions received in a given period to the total number of records in the file; *e.g.*, 300 transactions per day in a file of 30,000 records yields a daily activity ratio of 1%.

File Conversion. Refers to the process of converting *data files* from one format to another; *e.g.*, manually kept records to files created on a magnetic medium.

File Extent. A contiguous group of *tracks* on a particlar *file volume*; usually representing a *section* of a file.

File Gap. A space at the end of the file that signifies to the sytems where the file ends.

File Identification. A *code* which is devised to identify a *file.* The purpose of file identification is to ensure that no confusion exists between files having different data, and to provide a means by which *programs reading* and *writing* files may check that the correct files are input and output.

File Name. The set of *alphanumeric characters* which are used to identify and describe a *file* in a *file label.*

Filename Extension. A code, very often of three letters, that forms the second part of a filename and which has been separated from the file name by a period. This supplement to the name often is used to help differentiate the related files. For example, ORDER.BAS might be a Basic program for order entry; ORDER.SAV might be the executable version of ORDER.BAS; ORDER.DAT might be a data file that holds ORDER data.

File Organization. Refers to the arrangement of files on the storage media.

File Organization. Refers to the way in which *data elements* and/or *records* have been mapped on to the physical *storage* medium used for a particular *file.*

File Packing-Density. A ratio expressing the extent to which the *records* in a *file* have utilized the space set aside for it on a *disk.* A ratio of 4:1 implies that 1/4 of the available space assigned has been used to store records related to the file.

File Print. A *printout* of the contents of a *file* which is stored on some *storage device,* usually for the purpose of aiding *debugging.*

File Processing. File processing involves all operations which are connected with the creation and use of *files*. These opertions include; *creation, validation, comparing, collating, sorting* and *merging*.

File Structure. This term relates to the way that information has been organized into *fields*, *records*, *blocks* and *files*, and to the way in which they have been organized into the available *backing storage* medium, including structures created to assist in access to required units of information.

Film Optical Sensing Device. A device which is able to convert data recorded on film into a form acceptable to a computer by optical scanning.

Film Reader. Any device which is capable of transcribing data recorded on film into a form acceptable to a computer.

Film Recorder. An *output device* which is able to transcribe data from a computer onto a photographic file.

Firmware. Refers to programs or data stored in ROM. These are not alterable by software, and are not lost when the power is turned off. *See ROM.*

First Generation Computer. A computer using thermionic valves. Compare *second generation, third generation, fourth generation* and *fifth generation.*

First-in First-out. Refers to the processing of items in a list in such a manner that the earliest arrival gets processed first and the latest arrival gets processed last.

Five-Level Code. A *data communication code* in which five signal elements have been used to represent a single character. The signal elements representing each character are generally transmitted with framing *bits* to signify start and stop. In computer based communication systems, it is usual to use a seven-level code or an eight-level code for providing a greater range of characters and to avoid the use of *escape characters.*

Fixed-Length Record File. A data file in which each record is of the same length. *Contrast with variable length record file.*

Fixed Point Arithmetic. The carrying out of arithmetical calculations without regard to the position of the *radix point*, treating the numbers as integers for the purpose of calculation. The relative position of the point is to be controlled during calculations.

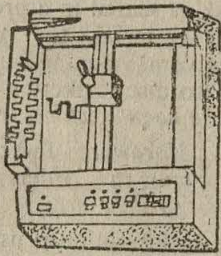
Fixed Point Part. In *floating point representation* a number is represented by the product of the fixed point part and the *index* raised to the power of the *exponent.*

Fixed Point Representation. Refers to a number notation system in which, typically, numbers are represented as integers with the decimal point assumed to be fixed and located to the right of the integer (in some cases the "fixed point" is located to the left). *Contrast with floating point representation.*

Fixed Word Length. A system of organizing a *store* where each computer *word* is composed of a fixed number of *character* or *bits.*

Flag. An indicator which is used in both hardware and software, associated with a special condition. A software flag is used to inform a letor program segment of a specific condition. Flags may, at various points in the program, be checked for certain conditions. Hardware flags may cause specific events to occur at designated times.

Flat Bed Plotter. A plotter that uses plotting feeds that move over a flat surface in both horizontal and vertical directions. Compare with drum plotter, in which heads move in one direction and paper in another.



Flat Bed Plotter

Flicker. In a raster scan display, flicker refers to the actual detection by the human eye of the repeated on-off cycle resulting from the phosphor screen image being regenerated by an electron beam 30 or more times per second.

Flip-Flop. A bistable circuit; for example, a circuit capable of storing a bit of information and of assuming two stable states (0 and 1) as long as power is supplied. Flip-flops may be grouped together to form registers.

Float. Means adding the *origin* to all *relative addresses* in a *program,* thus determining the area of *memory* occupied by the pragram.

Floating Lines. Signals within a computer are usually regarded to be in one of two on states, *e.g.*, high voltage =+5V and low voltage=+1V. Under certain conditions an off condition may prevail in which no signal gets discernible to logical devices connected to the line concerned. Such signals are known as *floating signals* ann the lines are known as *floating lines.*

Floating Point Number. A number which is expressed by using *floating point representation.*

Floating Point Package. *Software* which is provided with a computer system to enable the computer to carryout *floating point arithmetic.*

Floating Point Radix. In *floating point representation* a number *n* is represented by two numbers *a* and *b* where $n=a.r^b$. The radix is the particular value of *r* which finds use in the representation.

Floating Point Representation. Refers to a notation system in which the decimal point is not fixed; when representing these numbers in a computer the symbol typically has two parts. One part has the fractional component of the number; the other part is expressed as a power of the base (radix) of the number; for example, standard notation, 0.0000256; scientific notation, 0.256×10^{-4}; floating point representation, 0.256E-04.

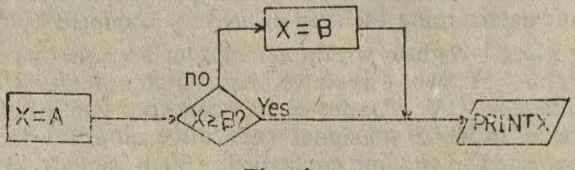
Floppy Disk. A flexible, flat, circular mylar medium that magnetically records and provides access to stored data. It has been divided into concentric circular tracks and wedge-shaped sectors. The disk is sealed in a protective square cover which is lined with a soft material, that cleans as it rotates. The cover is having several openings and notches to accommodate the disk drive. Also disc, diskette. *See digital recording*; *disk, magnetic*; *read/write head*; *sectors*; *tracks*.

Floppy Disk Controller. *Hardware* and/or *software* which is used specifically to control the orderly transfer of data between a computer and a *floppy disk drive*.

Floppy Disk Drive. A device which is used to handle one or more *floppy disks*. It includes a drive shaft to rotate the disks at the desired speed, and *read/write* heads and circuitry which enable data to be recorded upon and read from the disk surfaces. The disk drive also includes circuity which acts as external logic to enable the device to act as a *peripheral unit* to a *microcomputer* system.

Flow. A sequence of *events* which are usually represented by a *flowchart*.

Flowchart. Refers to a graphic representation of the sequences proposed to solve a problem.



Flowchart

Flowcharting. Flowcharting is a technique for representing a succession of events in symbolic form.

Flowchart Symbols. Flowcharts use standardized sets of symbols for representing operations. Boxes represent order or computations; diamonds represent tests and decisions; other shapes represent input/output, connector points, etc. The symbols help in organizing sequences of operations when writing computer programs.

Flow Direction. The method which is used to distinguish between antecedent and successor event on a *flowchart.* This may be done by means of arrows or by the convention that *flowlines* connecting antecedent to successor flow from top to bottom and left to right of a page.

Flowline. A line drawn on a *flowchart* which connects an antecedent event to a successor event.

Fluid Logic. The simulating of logical operations by varying the flow and pressure in a fluid—either gas or liquid. Fluid logic has been used to control the operations of *pneumatic computer.*

Font. A family or collection of printing characters of a particular size and style.

Forbidden Character Code. An *error detecting code* in which certain combinations of *bits* are not allowed and known as forbidden characters.

Force. Referring to intervene in the operation of a computer *program* by *executing* a *branch instruction* transferring control to another part of the *routine* .Forcing is usually performed to bypass an error condition which has caused the program to come to a *halt,* or to terminate a *run* by forcing *entry* to the *end of run routine.*

Foreground Processing. 1. In a *multi-access system,* it refers to processing which makes use of *on-line facilities.* 2. High priority processing which is taking percedence (as a result of *interrupts*) over *background processing.* 3. Low priority processing over which background processing is taking precedence.

Foreground Program. A *program* requiring *foreground processing.*

Form. A *document* having prepared spaces into which entries may be made by a human operator or a computer *printer.* Continuous form *sets* can be generated for printing of such documents at high speed under computer *program* control.

Formal Methods. Refers to the means of describing systems and program requirements symbolically and hence leaving no room for doubt or misinterpretation.

Format. (1) The arrangement of data into a specified layout; (2) The designated placement of text and margins, and other elements in hard copy; (3) Programming to set up text arrangements for outputting.

Formatting. (1) Setting up the order of the information which is input to a computer or a peripheral device; (2) Arranging the layout of the data which is output from the computer or a peripheral.

For/Next Loop. A section of code in BASIC which is going through a fixed number of iterations, based upon a preset index. *See do-loop.*

FORTH. A high-level programming language allowing the programmer to easily generate powerful (efficient) computer commands by using "primitives" (simple statements) to tailor highly complex instructions to a specific application. FORTH is characterized by its speed and economy of memory use.

FORTRAN. Formula Translator (acronym, pronounced as one word). A high level language which was originally developed by IBM for numeric and scientific applications. One of the oldest and most popular high level languages, it is now also used in many commercial and industrial applications. It must always be compiled, rather than interpreted.

Forward Compatibility Standards. Standards which are adopted to be sure that *programs* developed for one range of equipment can be utilized on a further range of a equipment which will replace the present installation.

Foundation Virtual Machine. A *virtual machine* which is established in a *virtual machine environment* for initialising the system, *i,e.*, to enable the system to be *loaded* or reloaded.

Four Address Instruction. A computer *instruction* whose *address* part is having four addresses, usually two *operand* addresses, the address of the destination of the result of the operation and the address of the next instruction to be carried out.

Fourth Generation. Computers using VLSI, very large scale integration.

Fourth Generation Language. Any *high level language* which is designed to enable users who are not trained programmers to develop *applications.* Often based on a non-procedural language having *relational data base* support.

Frame. 1. A transverse section of *magnetic tape* or *paper tape* which consists of one *bit* position for each tape *track.* For paper tape the term *row* was also used for frame. 2. Also, refers to a *unit* of information in *data communication*; *e.g.*, a page of information prepared for prepentation on a *visual display terminal.*

Framing. Units of data marking the boundry of *fields* or characters for *data transmission.*

Framing Error. If a receiving device fails to detect appropriate framing codes as part of a received unit of data, then it will register and report a framing error which is usually requiring automatic retransmission of the blocks concerned.

Free Format. No restrictions are imposed on the format in which the data is entered.

Frequency. The number of times a recurring signal repeats itself whithin a given unit of time. It is usually measured as the number of cycles per second. *See Hertz, MHz.*

Frequency Band. Refers to the range within which the *frequency* of a signal may be allowed to vary.

Frequency Division Multiplexing. A method which is used to transmit several signals along a single *data communications* circuit, in which each signal has been modulated on to a separate carrier wave and many carriers, each of different frequency, get transmitted simultaneously along the same channel. The carrier frequencies are selected so that the distance between signal frequencies ensures that there occurs no mutual interference.

Frequency Shift Keying. The term used for a method of *frequency* modulation in which digit signals have been represented by tones of specific duration and frequency transmitted to the line. The technique is used for the generation and transmission of dialling signals in a telephone network (*i.e.*, distinctive tones used for each of the digits 0 to 9 plus special keys as available on a push-button telephone pad).

Friction Feed. In a printer, a method by which paper is moved between the primary roller and the pinch roller (as in a standard typewriter).

FSK. An abbreviation of *frequency shift keying.*

Full Duplex. A mode of communications in which two systems can transmit and receive data simultaneously, so that two different sets of signals can be sent at the same time.

Full Page Display. Refers to a terminal that displays at least 80 columns (80 characters across) and 55 lines of copy (the average 8½ × 11 inch page capacity) on the screen at one time.

Function Codes. Codes that help control functions of peripheral devices. For example, a line feed for a printer would be a function code.

Function Keys. Special keys on the keyboard that are able to initiate a special function within a program, dependent upon how the programmer defines the keys in the program. The key will send a specific code to the program, which will be acted upon by the software.

Function Keys

FX. Fixed area (acronym, pronounce letters individually). An area on a disk that gets protected and that holds certain files and programs.

G

Gallium Arsenide. A *semiconductor* which is made of the elements gallium and arsenic. Semiconductor devices involving GaAs have characteristics of speed, heat tolerance and low-power switching which point to their use in optical devices.

Game Chip. A microelectronic component which is intended for use in a *home computer*, and includes a range of logical functions required for *games.*

Games. Computer *applications* which are used for amusement or education in which the user exercises knowledge, skill, dexterity of hand or quickness of reaction in response to audio/visual *events* presented on a *visual disply unit.* Games are generally carried out with *home computers* and three main classes of game can be recognised : (i) Games of strategy; *e g.*, chess. (ii) Games of adventure; *e.g.*, simulation of a quest. (iii) Games for amusement; *e g.*, arcade games.

Gang Punch. A *punched card* machine having a single *card track.* It is incorporating a *reading station* and a *punching station*, each with a position for each *card column.* The machine was used for reproducing information from a single card at the beginning of a pack into all subsequent cards of the pack.

Gap Digit. A *digit* present in a *word* which is not forming part of the information conveyed by the word, *e g* , a *parity bit.*

Gap Scatter. Refers to the deviation from correct alignment of the magnetic *read heads* for the several parallel *tracks* on a *magnetic tape.*

Garbage. (1) An accumulation of unwanted, meaningless data (2) Unreliable results of unreliable data that were put back into the computer.

Gates. An electronic circuit having several inputs and one output; the output is not acted upon until the input meets certain conditions. In a computer, this is known as a "logic circuit," which gives electronic results on the basis of logical function inputs.

General Peripheral Controller. A *hardware* unit, having a *processor* which controls the transfer of data to and from a range of *peripheral units* and *main store.* It usually operates under the control of commands which are set up by the main *order code processor.*

General Purpose Computer. A computer which is capable of operating on different *programs* for the solution of a wide variety of problems, as opposed to a *special purpose computer* specifically which is designed for solving problems of a particular type.

General Purpose Program. A *program* which is designed to perform some standard operation; *e.g.*, *sorting* or one of the *file processing* functions.

Generate. To use a *generator* for producing a specificized version of a *general purpose program.*

Generated Address. An *address* which is developed by *instructions* within a *program* for subsequent use by that program. It is also known as *synthetic address.*

Generation Number. Refers to a number forming part of the *file label* on a *reel* of *magnetic tape* or a *magnetic disk* file, which helps to identify the age of the file.

Generator. A *routine* producing a *program* to perform a specific version of some general operation by completing a predetermined framework with the details which are required for the particular application.

Giga. A prefix which is used to denote one billion.

GIGO. Garbage In Garbage Out (acronym, pronounce as one word). A saying referring to the inability of obtaining good results with bad data.

Glitch. An undesirable electronic noise or interference that causes errors or failures in a computer system.

Global Search. A routine that is able to search for every occurrence of a character, word, or phrase, within a text file.

Global Variable. Refers to a variable that may be referred to throughout a main program and all of its subordinates, as compared to a local variable that may be referenced only within the specific program segment in which it has been defined.

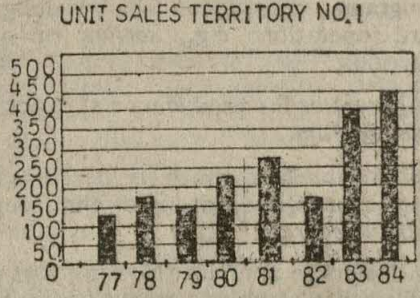
GOTO. (GO TO). A branching instruction which is used in high level programming languages.

GPIB. General Purpose Interface Bus (acronym, pronounce letters individually). The name given to the IEEE 488 bus standard. *See HPIB.*

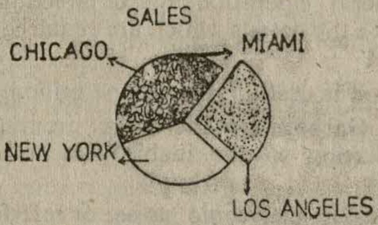
Graceful Degradation. Refers to machine breakdowns on computers; the ability to undergo graceful degradation ensures that failure of certain parts does not being about complete breakdown, but allows limited operation. It is also known as operating in crippled mode.

Graceful Exit. Refers to the ability of the user to exit from a program without having to turn off the machine.

Graphics, Business. Refers to various types of graphs and charts which represent sales, profits, losses, inventory, and similar concepts; for example, bar graphs, scatter graphs, and pie graphs.



Bar Graph



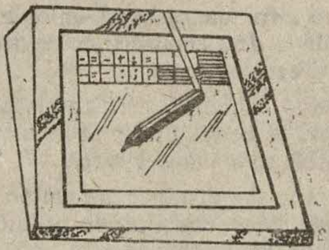
Pie Graph

Graphic Display. A specialized *display* unit which is used to present graphical information to a computer user.

Graphics. The use of images which are generated by *software* for output to a *graphic display.*

Graphic Solution. Refers to the result of problem solving which is put into a visual form for clarity.

Graphics Tablet. A popular type of digitizing device that is using a flat tablet and a stylus for graphic input. Existing drawings can be traced or new drawings created by moving the stylus across the tablet, which records the stylus position relative to an X-Y coordinate system and inputs this information into the system. The image that is being created will appear simultaneously on a connected display screen. The tablet may possess a menu of predefined specialized graphic symbols that can be chosen and used as an aid in creating drawings. The tablet offers an efficient method of converting object shapes into computer storable information. *See digitizer, cursor tracking, stylus.*

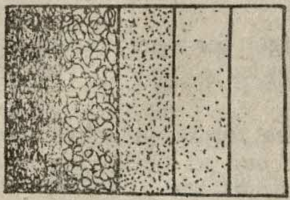


Graphics Tablet

Graphics, Three Dimension. *See line drawing, three-dimensional.*

Graphics, Two Dimension. *See line drawing, two dimensional.*

Grey Scale Images. Refers to a hierarchy of solid continuous blocks of single tones which can be combined in different sizes and shapes to form or represent an image. In its most sophisticated form, a sufficient number of grey scale tones can be combined and interpolated to give site to an image emulating a standard, continuous tone, black and white photopraph.



Grey Scale

Group Code. A *systematic error checking code* which is used to check the validity of a group of *characters* transferred between two *terminals.*

Grouped Records. Several *records* present in a single group in which the *key* of one record has been used to identify the group.

Group Indicate. The first record of a group is used so as to indicate information about the contents of the group.

Group Indication. Referring to a practice which is commonly adopted when printing a *totals only* tabulation on a *punched card tabulator.* A special device was employed for listing descriptive information from the first card of each group.

Group Mark. A special *character* which is used to indicate the end of a *group* of characters in *store.*

Group Polling. A method of *polling* which makes a number of devices within a given set to respond to a single inquiry.

Group Printing. In a *report program,* the information printed out for a *group* of *records* when a *key change* takes place.

Guard Band. Refers to a frequency band which is left unused between two *channels* of a *data transmission* device, usually to prevent interference between channels.

Guard Signal. A signal which is used to permit the output signals from a *digitizer* to be read only at moments when the signals are not susceptible to *ambiguity error*.

Guide Margin. Refers to the distance measured between the *guide edge* of a *paper tape* and the centre line of the first *track* of holes punched parallel to this edge.

Gulp. A slang term for a group of bytes.

H

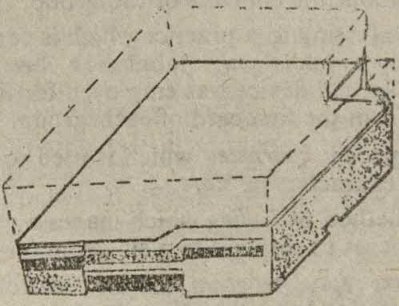
Hacker. Computer jargon for a person who is intensely interested in and/or very knowledgeable about computer hardware and software.

Half Adder. A device that forms part of an *adder* capable of receiving two inputs, *i.e.*, *augend* plus either *addend* or *carry*, and of delivering two outputs, *sum* and *carry*.

Half Duplex. Refers to the transmission that is capable of being sent in only one direction at a time.

Half-Duplex Channel. A *channel* which provides the transmission in both directions but not simultaneously.

Half-Height Floppy Disc Drivers. A design allowing a floppy disc drive to displace approximately one half the physical space required by a traditional floppy disc drive.



Half-Height Floppy Disc

Half Subtracter. A device forming part of a *subtracter* which is capable of receiving two inputs, *i.e* , *minuend* and *subtrahend* or *carry*, and of delivering two outputs, *difference* and a digit to be borrowed. It is also known as *one-digit subtracter.*

Halt. Refers to the situation in which the computer system stops processing in the middle of a program, often in response to a particular instruction.

Hamming Code. An *error checking code* (named after its inventor) in which each character possesses a minimum Hamming distance (*signal distance*) from every other *character* in the code. For example Hamming code using four ternary digits with minimum distance of 3 would be

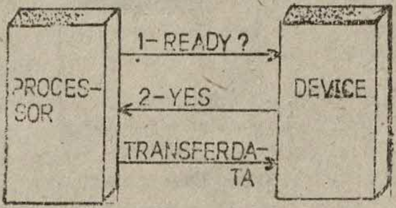
0000 0112 0221 1011 1120 1202 2022 2101 2210

Hand Coding. Programming is usually carried out with the aid of a language system which supports the programmer in the process called *program assembly* or *compilation.* In this process, *statements* written in the language form are first of all converted by *software* to *hexadecimal code,* and finally into *binary machine code.*

Hand-Held Computer. A system which is small enough to carry in a pocket. *Contrast with portable computer and desktop computer.*

Hand Punch. Refers to a devide which caused holes to be punched in *punched cards* as a direct result of pressure on a key of a *keyboard*; it had no automatic facilities.

Handshaking. A term referring to the communication of control information between the system components. An example is that one component will request another component to carry out some function; when the component is ready to carry out that function it will notify the original component.



Handshaking

Hands-On. Refers to the act of physically using a computer.

Hang-Up. Refers to the period in which the computer system stops forward progress in the program, and is for all practical purposes "halted" even though the machine is still running. An example is that an infinite loop can cause the system to become "hung" even though the program is still running. *See halt.*

Hard Copy. Output of information in permanent form, usually on paper, as opposed to temporary display on a CRT screen.

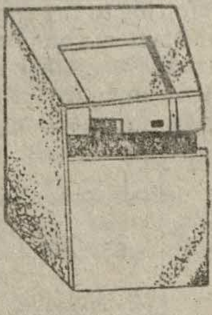
Hard Disk Cartridge. A cartridge containing a rigid disk designed to be loaded and unloaded into a hard disk system.

Hard Disk Cartridge

Hard Disk Cylinder. A term referring to the same track on all of the platters in a hard disk pack, producing a vertical stack of tracks that form a cylinder. A cylinder is created after a track has been filled when, so as to minimize head movements during access, subsequent records are allocated to the same track position on the disk directly underneath or above the original track. This allocation strategy cuts down on time required to retrieve data.

Hard Disk Pack. A removable set of magnetic disks which are loaded as a unit on a disk drive.

Hard Disk System. Refers to the hardware needed so as to interface hard disks for data and program storage. Compared to floppy disk systems, hard disk systems possess faster access times, higher capacity, and greater reliability.



Hard Disk System

Hard Error. An error which is caused by some malfunction in the hardware. An example is that a disk head is incorrectly reading the information on the disk.

Hard Sector Disk. Refers to a floppy disk that is divided into sectors and tracks by physical, nonalterable means like a hole punched in the disk to designate each sector. *See soft sector.*

Hardware. Refers to the physical components of a computer system: central processor, memory, disk drives, printer, terminal, computer boards, peripherals, etc. *Contrast with software and firmware.*

Hardware Availability Ratio. A ratio which measures the availability of a computer system to provide productive work. The availability ratio is normally expressed as the ratio of difference between *accountable time* and *down time* to accountable time. It is also known as hardware serviceability ratio.

Hardware Check. A *check* performed by *hardware* so as to detect errors in the transmission of data within a computer.

Hardware Dump Area. An area of *storage* which is used to record the internal state of an *order code processor* after the occurrence of a system *failure* (*e g., parity error*) which cannot be automatically corrected.

Hardware Recovery. The ability of a system to recover automatically from a *failure* and re-establish the current workload to enable processing to continue in a controlled manner.

Hash. Meaningless or unwanted information present, for example, in *store*, or written to *magnetic tape* so as to comply with *hardware* requirements on minimum *block length*.

Hashing Algorithm. An arithmetical function which is used to derive an *address* for the storage or retrieval of a *record* in a *hashed random file*.

HASP. Acronym for Hansten Automatic Spooling Processor. It is referring to a communications *protocol* for handing *remote job entry* functions with IBM 360 and 370 computers.

HDLC. Abbreviation of *high-level data link control*.

Head. A small electromagnetic device that is able to read, record, and erase data on a magnetic storage medium such as a disk or a recording tape. It is also known as a "read/write" head. *See digital recording*.

Head Crash. For disk systems, it refers to an unwanted physical contact of the read/write head against the magnetic disk surface causing damage to the disk as a result. *See disk crash.*

Header Label. A *block* of data at the beginning of a *magnetic tape file* having descriptive information to identify the file Examples of data on a header label are: *file name*, *reel number*, *file generation number*, *retention period*, and the date when the data was written to tape.

Head Gap. Refers to the distance between a *read* or *write head* and the surface of the recording medium (*magnetic tape*, *magnetic drum*, *magnetic disk* etc.).

Health/Zenith. Refers to a manufacturer and distributor of computer systems, kits, and electronic products.

Hello Program. The program that is first run in some systems when the machine is started, and which allows the user to sign on.

Help. A function which is available on many systems, it can make available to the user information on points that need further explanation.

Help Function. A feature of a system which is designed to assist a user in understanding and operating the system.

Hertz. (Hz). A measurement of frequency, in which one Hertz equals one cycle per second. Named for the physicist, Heinrich Hertz.

Hesitation. Refers to a short automatic suspension of a main *program* so as to carry out all or part of another operation *e.g.*, a fast transfer of data to or from a *peripheral unit.*

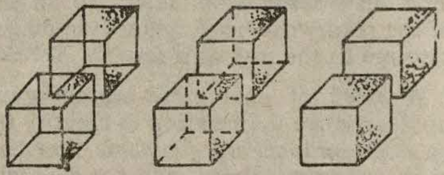
Heuristic. A trial and error method of getting a solution to a problem. *Contrast with algorithm.*

Hewlett-Packard. Manufacturer of a wide range of computer systems.

HEX. Hexadecimal (acronym, pronounce as one word).

Hexadecimal. Refers to a base 16 number system. The ten decimal digits of 0 to 9 are used to express the first ten digits of the 16-digit system. A,B,C,D,E, and F are usually used for expressing the remaining six digits from 10 to 15. The system is used extensively with microcomputers because two hexadecimal symbols can consistently represent 1 byte (8 bits) of binary data, providing a compact system of notation up to a numeric value of 255.

Hidden Line. In a graphic display of a three-dimensional object in line form, the line (or edge) obscured from the viewer's sight by the mass of the object itself, is visible due to that of the projection. Additional routines must be implemented for removing these "hidden lines".



Wire Frame Image

Hidden Edge Lines Identified

Hidden Edge Lines Removed

Hidden Line

High-Going Transition. Refers to an event in timing sequences which is implemented as electronic logic A transition involves a change of voltage level, *e g.*, from low to high to represent a change from 0 to 1 as in *binary* representation. A change from a lower voltage to a higher voltage is termed as a high-going transition, whereas a change from a high to a low is termed as a *low-going transition.*

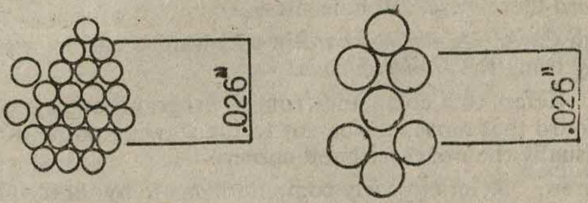
High-Level Data Link Control. A *cammunications* control procedure for checking the accuracy of data transfer operations between remote devices, in which data has been transferred in units called *frames*, and in which procedures exist for checking the sequence of frames, and for detecting errors due to *bits* being lost or inverted during transfer operations.

High Level Filestore A type of *filestore* which is used in an *operating system* to hold *physical files* needed *on-line*. The medium typically used is *magnetic disk* or *magnetic drum*.

High Level Language. Programming languages designed so users can write instructions in English-like statements rather than in machine language. One high level statement translates to several machine language statements. A compiler or interpreter must be used for this translation. Examples of high level languages include FORTRAN, BASIC, Pascal, PL/1.

High Level Recovery. Refers to the *recovery* from a *hardware/software failure* by use of resources and information not directly associated with the cause of failure.

High Resolution. Refers to the quality and accuracy of detail that can be represented by a graphics system such as a video display or a printer. Resolution quality has been found to depend upon the number of basic image-forming units (pixels) within a given area ; the greater the number, the higher the resolution.



High Resolution Tube

Conventional TV Tube Resolution

High Resolution Tube

Highway. Refers to a channel along which signals travel from one of several sources to one of several destination. It is also known as trunk or bus.

Highway Width. Means the capacity of a *highway* to transfer data simultaneously, the greater the width the faster the throughput.

HITS. Hobbyist's Interchange Tape Standard (acronym, pronounce as one word). A data recording format using tape cassettes; the standard format was designed to allow interchangeability of cassettes and programs.

Hit On The Line. An error condition which is caused by a momentary open circuit on a communications channel.

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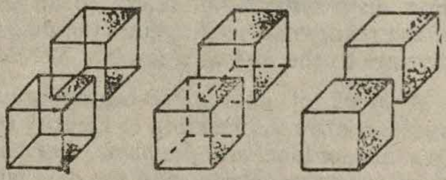

Wire Frame Image — Hidden Edge Lines Identified — Hidden Edge Lines Removed

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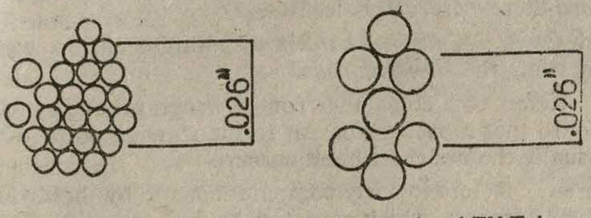

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Conventional TV Tube Resolution

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HLL. High Level Language (acronym, pronounce letters inividually).

HOL. High Order Languages (acronym, pronounce letters individually). *See high level language.*

Hold. Refers to the preserving of data in one *storage device* after transferring it to another storage device or another *location* in the same device.

Hold Facility. Refers to method of interrupting the operation of an *analog computer* without changing the values of the variables at the time of interruption, so that the computation can continue when the interruption stops.

Holding Beam. A continuous spray of electrons which are used for regenerating : electrons dissipated after being stored on the surface of a *cathode ray tube.*

Holding Gun. Refers to the source of a stream of electrons which make a *holding beam.*

Hold Instruction. An instruction which makes information to be retained in its original storage area even after it has been copied in another location due to a transfer instruction.

Hold Mode. Refers to the operating mode for an *analog computer* in which the *hold facility* is used.

Hole Site. Each specific area on a *punched card* or *paper tape* in which a hole could be punched, *e.g.*, on an 80-*column*, 12-*row card* there were 960 hole sites.

Hollerith Card. A *punched card* in which information was punched by using the *Hollerith code.*

Home. Refers to a command from a program or key on the keyboard that moves the cursor to the starting point of the screen, usually the upper lefthand corner.

Homebrew: Refers to early computers made by hobbyists (often in their garages), which gave rise to the personal computer and the entire resulting industry.

Home Computer. A *personal computer* having limited capability. It is largely constrained to use for computer games.

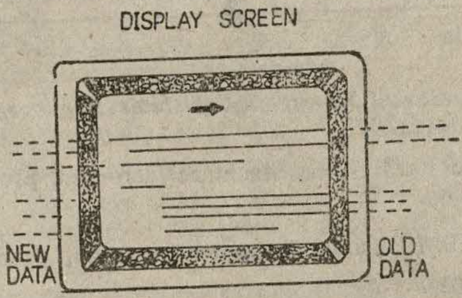
Hoot Stop. A *closed loop* producing an audible signal which is generally used to indicate an error or for operating convenience.

Hopper. Refers to a device which holds *punched cards* and presents them to a feed mechanism for reading or punching.

Horizontal Feed. A *punched card* was kept in a *hopper*, entered and traversed the *card track*, all in a horizontal position.

Horizontal Flowcharting. Refers to a technique for recording the movement of payer in an organization. It is different from ordinary *flowcharting* by the fact that the movement of a recording medium is charted rather than the information it records.

Horizontal Scrolling. Refers to the ability of the system to shift horizontally blocks of lines of text or data in order to view more characters than can fit on the screen at one time.



Horizontal Scrolling

Host Computer. Refers to any central computer which provides data, information, and computing facilities to a distributed population of terminals. The terminals could be connected to the host by permanent fixed circuits or by dial-up lines.

Hostile Environment. Refers to the practice of applying software to a system for which it was not designed, using special utilities to make the software and the system compatible.

Housekeeping. *Routines* within a *program* which are not directly concerned with the solution of the problem.

HPIB. Hewlett-Packard Interface Bus (acronym, pronounce letters individually). One of a number of standards for connection of hardware. Also called the general purpose interface bus (GPIB).

Human Engineering. The theory and application of designing so as to serve people, as opposed to designing for a machine. *See ergonomics.*

Hub. Refers to the hole in the middle of a *reel* of *magnetic tape* or *floppy disk*, which fits over the *capstan* when the reel is mounted on a *tape deck*.

Hybrid Computers. The term hybrid computer is frequently used to refer to any mixed computer system in which *analog* and *digital* computing devices are combined.

Hybrid Interface. Refers to a channel for connecting a *digital computer* to an *analog computer*. Digital signals get transmitted in serial mode by the digital machine and are converted and transmitted to the various operating units in the analog machine as simulaneous signals. On the other hand data collected as a set of simultaneous readings from the analog units are digitized and transmitted in serial mode to the digital computer. Both control signals and data may be transferred through the interface system.

I

IAL. Abbreviation of *international algebraic language*, which developed into *ALGOL.*

IBM. International Business Machines (acronym, pronounce letters individually).

IBM PC^{TM}. IBM Personal Computer (acronym, pronounce letters individually).

IC. Integrated Circuit (acronym, pronounce letters individually).

Icon. A symbol which is displayed for a user by a *program* of *operating system*, to represent an event or object which might otherwise need a lengthy textual description. Systems based on this concept often include a pointing device such as a *mouse*, *touch sensitive screen* or a *light pen.*

Identification. A label consisting of a coded name that helps to identify any unit of data ; *e.g.*, a *file name.*

Identification Division. Refers to one of the four divisions of a *COBOL program.* In the identification division the programmer provides descriptive information which identifies the program being *compiled.*

Identifier. A *label* identifying a *file* of data held on an *input* or *output device*, or identifying a particular *location* in *store.*

Identifier Octet. An *identifier* of eight contiguous *bits.*

Identity Element. A logical element which is operating with *binary* signals, and provides one output signal from two input signals. The output signals will be 1 if, and only if, the two input signals are alike ; *i e.*, both inputs are 1 or both 0.

Identity Unit. A device having several *binary input signals* and a single *binary output signal* which has the value 1 if all the input signals are identical, and 0 if they differ. An identity unit having only two input signals is also termed as an *equivalence element.*

Idle Characters. Characters which are used in data communication to synchronize the transmission.

Idle Time. Refers to the period during which a system, or part of a system, is not being used to lack of demand. For example, the printer could be in use but the central processing unit could have idle time.

IEEE. Institute of Electrical and Electronic Engineers (acronym, referred to as I-triple-E).

If-Then-Else. A programming instruction which specifies a set of instructions to be carried out under certain conditions. For example, in "if X=O," then X=O is the condition that determines what will happen next, and the computer will be directed to branch to the appropriate statement.

Ignore Character. A *Character* which is used to cause some action to be inhibited, or a character which is itself ignored.

IKBS. Abbreviation of *intelligent knowledge-based system.*

Illegal Character. A group of *bits*, holes or other units which are used to represent any of the symbols in the *character set* of the system.

Image. An exact copy of an area of *store* which is located in another part of store or in a different storage medium.

Image Processing. A method of inputting two-dimensional images to a computer and then enhancing or analyzing the imagery into a form that will be more meaningful to the user. Examples include enhancement of drawings for animation, photographs or computer-aided design models.

IMIS. Acronym of *Integrated Management Information System.*

Immediate Access. Refers to a *store* in which information can be retrieved without significant delay.

Immediate Access Store. A *storage device* in which the access to data can be achieved without significant delay.

Immendiate Data. Unit of data which has been included in an *instruction statement* so that it appears immediately after the *operation code* of the instruction in *memory*. It is also known as *literal operand.*

Impact Printer. A printer in which a hammer or striking unit transfers ink from ribbon to paper. These include band, drum, chain, cylinder, typeball, daisy wheel and thimble design printers. *See priter.*

Imperative Macroinstructions. Macroinstructions which give rise to *object program* instructions ; as distinct from *declarative macro-instructions*, which ask the *compiler* to perform some particular action.

Imperative Statements. *Instructions*, in a *source language program*, which are converted into the actual *machine language* instructions of an *object program.*

Implement. To carry out or give physical, functional reality to a theory or plan. Various types of software are the tools for implementing usable applications of mathematical, logical, or business theory.

Implementation. The procedures which are involved in installing and testing hardware and software in computer systems.

Incident. A *failure* needing activity by an operator to correct or remove the jobs concerned.

Incidentals Time. Time during which a computer is being used effectively, but not for productive *runs* or *program* development. Incidentals time could be utilised for demonstrations, training, etc.

Inclusive-Or Operation. Refers to a *logical operation* applied to two *operands* which will produce a result depending on the *bit patterns* of the operands and according to the following rules for each *bit position* :

Operands		Result
p	q	*r*
0	0	0
1	0	1
0	1	1
1	1	1

For example, operating on the follwing 6-bit operands,

p=110110
q=011010
——————
r=111110

It is also known as disjunction, logical sum, or operation. *See Boolean algebra.*

Incomplete Program. A *program* having a basic framework of *instructions* which are designed to perform some general type of operation, but which cannot be run until the specific requirements of a particular version of the operation get supplied to the program either by *parameters* or by *own coding*.

Inconsistency. A data condition detected by *software*, in which the data concerned is found to be having contradictory statements.

Increment. (1) As a verb, to increase an integer by a specified amount; (2) As a noun, the amount by which the integer is increased.

Incremental Computer. A computer which is designed to process changes in variables; for example a *digital differential analyser*.

Incremental Display. Synonymous with *cathode ray tube visual display unit* ; a device which is employed to convert *digital data* into character or graphical form.

Incremental Dump. Refers to a method of *dumping* in which data has been preserved for *security* purposes, by regularly *writing* away small amounts of data at frequent intervals.

Incremental Plotter. A unit which provides output from a computer in the form of continuous curves or points plotted, along with information in character form, under control of a *program.*

Incremental Representation. Refers to a method of representing variables which are used in *incremental computers,* in which changes in variables rather than the variables themselves are represented.

Index. 1. A table of references which is held in *memory* in some *key* sequence. It may be *addressed* to get the addresses of other items of data, for example items in a *file* on some *backing store.* 2. A number which is used to select a particular item from an *array* of items in *memory.*

Indexed Address. An *address* which is *modified* by the contents of an *index word.* It is also known as variable address.

Indexing. A method which is used to retrieve information from a *table* in *memory* or a *file* on a *direct access store.*

Index Point. Refers to a reference point during the cycle of operation of any *punched card machine* in which cards got transported by the action of rotating shafts.

Index Register. In some computers *program modification* is carried out automatically and indeed it may be always used to *address* certains *locations* within *memory.* In such machines there will be at least one index register which will be having a *modifier* to enable data to be indirectly addressed. Each program *instruction* must therefore refer to an index register when addressing locations in store. It is sometimes known as a *modifier register.*

Index Sequential File. A *file* in which *records* are being subjected to *index sequential file organization.*

Index Word. During *program modification* an index word may be used to have a *modifier* which will be added to a *basic instruction* when it gets executed. An index word may, for example, be used to *address* data stored in a *table* in *memory.*

Indicator. 1. A lamp or display device on a *peripheral unit* or a *console.* 2. A device which can be set when a specified condition occurs (*e g.*, when a calculation has produced a negative result) and which may be tested by *program* for initiating an appropriate course of action.

Indicator Chart. A chart which is used by a programmer during the *logical design* and *coding* of a *program* for recording details about the use of *indicators* in the program.

Indirect Addressing. A *programming* technique in which the *address* part of an *instruction* refers to another *location* which has another address. This further address may specify an *operand* or yet another address. It is also known as multi-level addressing.

Indirect Control. Means the relationship between two units in which one controls the other by some sequence of events involving manual intervention. The unit being controlled is *off-line* to the controlling unit.

Industrial Data Processing. *Data processing* which is mainly concerned with or controlling some industrial process, as distinct from *commercial data processing* or *scientific data processing.*

Infix Notation. A notation which is used for representing *logical operations* in which the *operator* is written between the *operands*, *e.g.*, A&B where & represents the operation 'and'.

Informatics. Refers to the science or art of processing *data* to provide *information.*

Information. Sometimes the following distinction is made between *information* and *data* : information is obtained from the processing of data. *i.e.*, information is obtained from the assembly, analysis or summarizing of data into a meaningful form.

Information Bits. In a signal carried in coded form, information bits are *characters* or *digits* which are data and which could be processed to provide *information* subsequently, the term does not include digits which may be required for *control* purposes by *hardware* or *software*.

Information Channel. The *hardware* which is used in a *data transmission* link between two terminals.

Information-Feedback System. A control system which is used in message transmission, in which information received at a terminal gets re-transmitted to the sending terminal for automatic checking.

Information Processing. Refers to the processing of data to derive meaningful results as *information.*

Information Requirements. The results which are required from any series of data processing operations ; *e.g.*, the information required by management as output from a system.

Information retrieval. A Branch of computing technology which is related to the storage and categorization of large quantities of information and the automatic retrieval of specific items from the *files* and indexes maintained.

Information Retrieval Techniques. Refers to the problems of recovering, from collections of data, those particular items of information which are required at a particular time for a particular purpose.

Information Separator. An *indicator* used to separate *fields* or items of information within a *record*, particularly a *variable length record*.

Information System. A general term including all the operations and procedures involved in a *data processing* system.

Information Technology. Covering all aspects of the art or science of processing *data* to produce information.

Information Theory. Refers to the theory which is concerned with the rate of information transmission over a communications network.

Information Word. A word that conveys computer information rather than an instruction.

Inherited Error. An error in a result or intermediate result which is attributed to some previous stage of processing. For example, in *single-step operation*, an error carried through from a previous step.

Inhibit To prevent a particular signal from occurring, or to prevent a particular operation from being performed.

Inhibiting Input. Input that in some way inhibits production of output.

Inhibiting Signal. A signal preventing an operation from being performed.

Inhibit Pulse. A *pulse which is* applied to a *ferrite core* to oppose a corresponding *write pulse* and thus prevent the cell from assuming a set condition.

Initial Instructions. A *routine* stored within a computer to facilitate the *loading* of *programs*. It is also known as initial order.

Initialization. (1) A process which is carried out at the beginning of a program. It sets all starting values within the system to the prescribed conditions needed for use ; (2) A procedure which is carried out when a disk is first used. It is done only once per disk, not each time the disk is used. The disk is re-initialized only if the user desires to clear out all the old files and start with a blank slate. Disk initialization carries out these steps : (*a*) enters DOS onto disk ; (*b*) enters the program that runs each time the disk is booted ; (*c*) defines the sectors ; (*d*) establishes the volume table of contents.

Ink Bleed. Refers to the flow of ink by capillary action beyond the prescribed area of characters when characters are being printed for *optical character recognition*. Such action can not allow the character from being recognized when it is subsequently *read*.

Ink Jet Printer. A type of printer in which dot matrix characters are formed by ink droplets electrostatically aimed at the paper surface. Some advantages are high resolution, color reproduction (if color is used), and quiet operation.

Ink Jet Printer. A *printer* using a technique of projecting droplets of ink at paper to form the required image.

Ink Smudge. Refers to the condition in which ink appears outside the prescribed area of a printed character.

In-Line Coding. A collection of *program instructions* that have been written as part of the *main path* of a *routine.*

In-Line Subroutine. A subroutine that is inserted into the main routine as many times as it is needed.

In-Plant System. Relating to a communications system for handling data automatically within a particular building or group of buildings, *e.g.*, a factory *input station*, *local area netwotk.*

Input. The process of transferring *data*, or *program instructions*, into *memory* from some *peripheral unit.* Sometimes it is used to denote the data itself, sometimes to denote the signal applied to a circuit or device

Input Area. An area within *memory* which is reserved for data input from a *peripheral unit* or *backing store.* The data once received may be *edited* and distributed to *work areas* for processing. It is also known as input block.

Input Devices. Within the *central processor* of any computer, information could be processed at very high speeds, but before the central processor can be set to work, the data and *programs* have to be entered into the computer *memory.* This is carried out by means of input devices which provide a vehicle for communication between the computer and the people who are concerned with its operation.

Input Instruction Code. An *instruction set* forming part of some automatic input *language* which has been designed to simplify the programmer's task in writing an *input routine.*

Input/Output. The processes which are involved in transferring information into or out of a central processing unit.

Input/Outpur Buffers Areas of *memory* which are assigned to receiv data transmitted to or from a *peripheral unit.* The use c buffers areas enables a number of peripheral units to be activated simultaneously at full speed while data is processed within the *central processor.*

Input/Output Channel. A *communication channel* for transmiting data to and from a central computer.

Input/Output Control The *hardware/software* system which controls the interaction between a *central processor* and its *peripheral units.*

Input/Output Processor. (IOP). An auxiliary processor dedicated (used for this one purpose only) to controllin I/O transfers, which frees the central processing unit (CPU) for other tasks.

Input/Output Routines. *Routines* which are specifically designed to simplify the *programming* of standard operations involving *input/output* equipment, e g., the *blocking* of *records*, use of *input/output buffers.*

Input/Output Switching. Relating to a technique in which *peripheral units* are assigned more than one *channel* for communicating with a *central processor.*

Input/Output Trunks. *Interface* channels between a *processor* and its *peripheral units.* The number of peripherals which are connected to a processor depends on the number of trunks available.

Input Register. A *register* which is designed to accept data from a *peripheral unit* at relatively slow speed and to supply this data to the *central processor* at higher speed as a series of units.

Input Routine. That part of a *program* which is able to control and monitor the transfer of data from some external medium to an *input area* in *memory.*

Input Storage. An area of *memory* which has been assigned to the task of holding *data* input from a *peripheral unit.* Also known as *input area,* input block.

Input Unit. Any *peripheral unit* which provides input to the *central processor* of a computer, *e.g.,* a terminal.

Inquiry Display Terminal. A device having a *keyboard* and a *cathode ray tube* display unit. Inquiries are provided to the computer by means of messages typed on the keyboard, and results are displayed on the cathode ray tube.

Inquiry Station. A terminal from which a *remote inquiry* could be transmitted to a central computing system.

Inquiry Unit. Any device used for transmitting an inquiry into a central computing system.

Inscribe. To rewrite data on a document in a form which is capable of being read by a *character recognition* device, *e.g.*, the printing of the amount of a cheque in *magnetic ink* characters on the original cheque.

Instruction. A single operation to be executed by the computer. Instructions may move data, perform arithmetic and logic functions, control I/O devices, etc. A sequence of instructions forms a program.

Instruction Address. The *address* of a *location* having an *instruction.*

Instruction Address Register. A *register* which forms part of the *program controller.* and which stores the *addresses* of *instructions* so as to control the retrieval of the instructions from *memory* during the operation of a program.

Instruction Area. The area of *memory* which is used to store *program instructions*

Instruction Classification. Most computers can perform a wide range of *instructions* and these are defined by the processor used.

Instruction Code. The set of symbols and characters which are forming the rules of a particular computer code or *programming lauguage*. It is also known as order code, *machine code, instruction set, function code, operation code.*

Instruction Counter. A device indicating the *location* of the next *instruction* to be obeped in a *program.* Usually it is part of, or associated with, the *program controller.*

Instruction Cycle. The time necessary to process a program instruction. This includes fetching, decoding, and execution.

Instruction Cycle. The complete sequence of events which is concerned with the *execution* of a single step in a computer *program* and usually entailing two major sequences : *instruction fetch* concerned with the reading of an instruction from memory into the central processor where it gets interpreted ; and *instruction execute*, entailing the completion of the operations defined within the instruction itself.

Instruction Decoder. Refers to that part of a *central processor* which interprets the meaning of each *program instruction* and prepares the central processor to *execute* the instructions.

Instruction Execute. Refers to the cycle of events which cause the *central processor* to carry out the specific events indicated in an *instruction statement*.

Instruction Execution Time. Refers to the overall time taken to *fetch* and *execute* a specific *instruction* (usually measured in microseconds).

Instruction Fetch In most digital computers, a single instruction is performed as two distinct cycles. First, the instruction gets retrieved from *main memory* and stored in an *instruction register* and the contents of the register are examined automatically to set up the *central processor* for executing the instruction. Next, the instruction is *executed* as a sequence of events involving the memory *locations* and *registers* nominated in the instruction itself and in accordance with the operation code specified. These are called fetch and execute cycles, and the first is an instruction fetch. After the second, a new instruction is performed.

Instruction Mix. The composition of a specific set of *instructions* in a given *routine* or *program.* The mix of instructions may be so selected to achieve an objective, such as a test of the efficiency of a computer or microproces or in handling problems of a given type.

Instruction Register. A control unit register in which the address of the current instruction has been stored. Any data in an instruction register is always treated as an instruction.

Instruction Set. Refers to a means of describing the basic capabilities of a CPU, usually a listing of all the types of instructions a CPU can execute ; for example, arithmetic, data movement, decision and control, and input/output

Instruction Statement. Refers to a single line in a *source program* which forms a step in a computer program and defines the operation to be performed at that step and the items of data and/or *memory addresses* to be affected by the operation.

Instruction Time. Refers to the time taken to *staticize* an *instruction* within the *instruction registers* of a computer, plus the time required to execute the instruction.

Instruction Word. A computer *word* having an *instruction*. An *instruction format* is usually designed to fit within the basic *word length* of a computer. Thus instructions may be moved and manipulated like any other items of data stored in memory.

INT. Interrupt (acronym, pronounce as one word).

Integer. A whole number, one with no fractional parts.

Integrated Circuit. A group of interconnected components fabricated on a tiny clip of silicon. The components form a functioning electronic circuit.

INTEL Corp. Manufacturers of microprocessors, including the INTEL 8080, 8086, and 8088.

Intelligent Terminal. A terminal having microprocessor control. *See dumb terminal.*

Interactive. Refers to the ability of the system to handle immediate-response communications between the user and the machine. *See user interaction.*

Interest Worlds. Areas of special interest for which the computor can serve as a tool or laboratory ; for example, art, music, mathematics, physics, or language.

Interface. (1) The hardware and/or software which is necessary to connect one system or device to another ; (2) To physically connect two or more components of a computer system in a way that allows them to transmit and receive information.

Interlaced Field. A technique found in raster scan display systems so as to minimize flicker on the display screen.

Interleaving. A technique used in *multiprogramming*, in which *segments* of one *program* have been inserted in another program to allow the effective execution of both programs simultaneously.

Interlude. A *routine* or *program* which has been designed to perform minor preliminary operations, usually of a *housekeeping* type,

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Interlude. A *routine* or *program* which has been designed to perform minor preliminary operations, usually of a *housekeeping* type, before the main routine has been entered. The area occupied by the interlude may be *overwritten* after it has performed its operations.

Intermediate Control. Refers to a level of control which got established when *intermediate totals* were produced on a *punched card tabulator* (as distinct from major totals and minor totals).

Intermediate Storage. A medium of *store* which is used for holding working figures or for storing totals temporarily until required.

Intermediate Total. A total which is produced at an *intermediate control change*, *i.e.*, resulting from a change of control data at neither the most not the least significant level.

Internally Stored Program. A *routine* which is stored within a computer *memory* rather than on a *backing store* or some other external medium.

Internal Timer. An electronic *timer* providing the facility of monitoring or logging events at predetermined intervals.

International Algebraic Language. An early form of the language which was developed into *ALGOL*.

Interpret. To translate a higher-level language program into a program that the machine understands.

Interpreter. A program which is designed to translate high level language instructions (source code) into binary machine code (object code). An interpreter is able to translate each individual high level statement into object code and executes it before reaching the next statement. Once the statement is executed, its object code is discarded and that statement must be re-translated if it is encountered again. This may be time-consuming, particularly in loop conditions. Interpreted programs tend to run more slowly than compiled programs, where all the statements get translated before execution and retranslation of the same statement is not necessary. *See complier.*

Interpretive Programming. Refers to the writing of *programs* in a *source language* which is subsequently *executed* by us ng an *interpretive routine*.

Interpretive Routine. A *routine* which is able to translate *pseudocode instruction* into *machine code instructions* during the live operation of the routine.

Interpretive Trace Program. A *trace program* which is able to translate each *symbolic instruction* into its equivalent *machine code* before executing it and recording its result.

Interrecord Gap. Refers to the distance between *records* on a *magnetic tape* where records are written singly as *blocks*.

Interrogating Typewriter. A typewriter which is connected to a *central processor* for the purpose of communicating with a *program in main memory*.

Interrupt. If an input/output device needs to use the CPU for processing, it sends a service request signal to the central unit (CPU). If it is accepted, the CPU halts (interrupts) its current process, saves its contents, and branches to the appropriate I/O routine to service that I/O device. Once the service gets completed, the CPU returns to the process it was involved in before the interrupt, or to the interrupt request that is next in priority.

Interrupt Event. An *event* causing immediate entry into a predetermined *procedure*.

Interrupt Handling. Most digital computers have the capacity to recognize several external requests from devices which require immediate attention or service. These devices request attention by sending an *interrupt* signal to the *central processor*. Where several such requests may occur simultaneously, a computer must be equipped with the necessary logic for enabling the processor to allocate and resolve priorities.

Interrupt Input/Output. Refers to a method of organizing and controlling the transfer of data between a central computer and its *peripheral units*, in which control signals from external devices signify that the devices need attention. It is usually arranged that the *central processor* gets diverted from its current task for servicing the particular device requesting an interrupt.

Interrupt Mask. A method of ignoring an *interrput* when it takes place and postponing action required until some later point in time.

Interrupt Service Routine. A *program* which is *executed* when an *interruput* takes place; the purpose of this program is to preserve (and later restore) the contents and status of *registers*, so that an interrupted program can be resumed after the interrupt request has been handled.

Interrupt Signal. The *signal* generated so as to cause an *interrupt* to occur.

Interrupt Trap. A *switch* under *program* control which prevents or allows a corresponding *interrupt.*according to its setting.

Interstage Punching Punching which took place between the normal *punching positions* on a *punched card* Used in a punched card system in which each *card column* contained the equivalent of two columns of information.

Intersystems Communications. Refer to the ability of two or more computer systems to share *peripheral units* and to intercommunicate by means of common *input* and output *channels* or by direct linking of *central processors.*

Inversion. Refers to the process of creating an *inverted file* from a *file* organized in some different way.

Inverter. A *logic element* having one *binary* input signal and carrying out the logical function of *negation.*

Invigilator. A device which checks the performance of a *control unit* and generates a signal if the response to control action does not conform to specified limits.

Invisible failure. Refers to a *failure* of either *hardware* or *software* which has no noticeable effect on the operation of a system.

I/O Input/Output (acronym, pronounce letters individually).

I/O Bound. Describes a situation in which the speed of a program or computation is limited by the capabilities of the input/output devices and/or interfaces. For example, a central processing unit that operates in a billionth of a second must wait for a printer that operates in one tenth of a second. *See idle time, processor bound.*

IOCS. Input/Output Control System (acronym, pronounce letters individually).

IOP. Input/Output Processor (acronym, pronounce letters individually).

IPOT. Acronym of *Inductive PO Tential divider.*

Irreversible Magnetic Process Refers to a change of magnetic flux within a magnetic material which persists after the magnetic field causing the change is removed.

ISAM. Indexed Sequential Access Methods (acronym, pronounce as one word). It refers to a procedure for strong and retrieving data. It uses a set of indexes (such as the table of contents in a book) that describes where the records are on the disks. Each record possesses "key" information, such as a customer name, which is used to retrieve the whole record.

ISO. International Standards Organization (acronym, pronounce letters individually). An international agency with functions similar to ANSI in the U S , which is responsible for developing standards for information exchange, such a character codes.

Isosynchronous Serial Input/Output. Refers to a form of *serial transmission* in which data gets transferred in asynchronous *character* format, including start/stop *bits*, but as part of a synchronous data stream bounded by *sync characters.*

IT. Abbreviation of *information technology.*

Item Advance. A method which is used for operating successively upon a group of items in *memory.*

Item Design. Refers to the designing of a *record* or *file* so as to achieve efficient processing or efficient *input/output* operations.

Item of Data. Any data which is treated as a unit within a program or process, *e.g.*, a single *operand* or an entry in a *table.*

Item Size. Refers to the number of *characters* or *digits* in an *item of data.*

Iteration. A repetition of one or more statements in a program, such as a sequence of statements in a do-loop.

Iterative Process. A process for calculating a result by carrying out a series of steps repeatedly, and in which successive approximations are made until the desired result is obtained.

Iterative Routine. A *program* which achieves a result by repeatedly carrying out a series of operations until some specified condition is obtained.

I-Triple-E. *See IEEE.*

J

Jack. A connecting device which is used for terminating the wiring of a circuit, to which access is obtained by inserting a *plug.* Otherwise called *socket*, or, in *punched card* machines, *hub.*

Jam. A machine fault which does not allow *punched cards* from feeding through a machine and causes a piling up of cards on the *cards track.* It is also known as wreck.

JCL. Abbreviation of *job control language.*

Job. A program and data, or group of programs and data, organized for processing by a computer.

Job Control Language. A *language* which is associated with an *operating system* and enables the user to express to the system the requirements for the control of the *jobs* within the system.

Job Control Progam. Specifies particular instructions to the operating system stating the conditions needed to run a job; for example, input/output requirements, etc.

Job Flow Control. Control over the sequence of *jobs* being *processed* on a computer, so as to maximize the efficient use of *peripheral units* and *central processor* time. Job flow control may be carried out manually, *e.g.*, by a work controller, or by means of an *operating system.*

Job Oriented Terminal. A data terminal which was designed to allow data to be transmited to a computer directly from the data source. An example is that a cash register is designed to collect data on a *cassette* tape which can be fed directly to a computer.

Job Stream. A group of *jobs* which run consecutively in a processing system and generally under the control of a *scheduling* system.

JOVIAL. A *programming language* which was based on *IAL*.

Journal. A *file* containing *messages* within an *operating system* so that information becomes available both for *restarts* and for historical analysis of the functioning of the system.

Joystick. Refers to a vertical stick or lever that can be tilted in various directions to indicate direction of cursor movement on a screen. Most joysticks are able to move the cursor only vertically and/or horizontally.

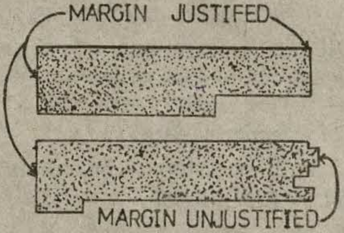
Jump. Same as branch.

Jumper Selectible. An option on hardward that allows the user, typically through use of a DIP switch, to change various characteristics of the hardware.

Jumper Tester. A device that can test whether or not the assorted options of a device are functioning.

Junk. Garbled data, most often referring to signals which are received in communications.

Justification. Spacing of text or graphics to produce an even, vertically aligned right-or left-hand margin.



Justification

K

K. An abbreviation for *kilo* which is used to denote a thousand. It is commonly used to denote 1024 or 2^{10}, so that a 4K *byte memory* has 4096 bytes of storage.

KCS. An abbreviation for a thousand *characters* per second.

Kernel 1. In a *virtual machine* it refers to a set of *procedures* controlling real *resources*. 2. Refers to the message handling facility of a control system.

Key. (1) A field or concatenation of fields within a record which is utilized in identifying an item or record for access purposes; (2) An individual button of a keyboard which is used to generate a code to represent a character.

Keyboard. An input device which consists of switches with marked keytops that, when pressed manually, generate a code representing individual characters. Also, see *ASCII keyboard*, *QWERTY keyboard*.

Keyboard Computer. A computer receiving *input* directly (and only) from a *keyboard*.

Keyboard Entry and Inquiry. The use by an operator of a *keyboard* for providing a computer with information and to establish what is stored in any specified *location*.

Keyboard Lockout. An interlock on a *keyboard* on a *data transmission* circuit which does not allow data from being transmitted while the transmitter of another station on the same circuit is in operation.

Keyboard Processor. A processor which is used in the keyboard to determine the active key position, to look up a corresponding character code in memory (keyboard ROM), and to place the appropriate code in the data bus.

Keyboard ROM. A small ROM (Read Only Memory) in the keyboard that is having standardized character code tables used by the keyboard processor so that the appropriate code can be looked up on the data bus.

Key-Driven. Referring to devices which need operators to depress a *key* in order to translate a character into a form which a machine can recognize; *e.g.*, a *terminal*.

Keying-Error Rate. Refers to the ratio of incorrectly keyed signals to the total number of signals keyed. The term is usually (but not necessarily) used in a *data transmission* context.

Keypad. Usually a small group of keys which are set up for a special purpose, such as the numerical keys to the right of the QWERTY keyboard.

Keypunch. Refers to a device that records information by punching holes in cards to represent letters, digits, and special characters.

Key Stations. The number of terminals which are used for data input on a multiple-user system.

Key Switch. The actual switch part of a key—the input key on a keyboard. The most commonly used is a leaf contact-type switch, which yields high-speed operation.

Keyword. In *information retrieval* systems, it refers to the significant word in a phrase; used for the significant word in a title which is describing a document. For example, in the title 'The Practice of Philately' the word 'philately' is the keyword, while the other three are having no significance on their own.

Kilo. A prefix often used to represent 1000. In the context of computer use, it is not exactly equal to 1000, but refers to 1024—or 2^{10}—which is a convenient binary approximation of 1000. A 1K byte memory storage is having 1024 bytes; a 64K byte memory has 65,536 bytes. A 4K chip is a 4,096 bit chip. When not used in reference to a chip, it usually reveals the number of bytes; when used in terms of a chip, the number refers to bits.

Kilobaud. One thousand bits per second.

KWIC. Key Word In Context (acronym, pronounce as one word). A permuted index (one that offers lists of titles with each of the major words as the first word, and the rest of the words following) that is using key words or phrases.

L

Lable. Refers to a group of *characters* which are used as a *symbol* to identify an items of data, an *area* of *memory*, a *record* or a *file*.

Label Group. A collection of *labels* which are held in an *operating system*, usually of the same type.

Label Identifier. A set of *characters* held within a *label* which are used to identify the type of item labelled.

Label Record. A *record* which is used to identify a *file* recorded on some magnetic storage medium such as *magnetic tape header label.*

Laced Card. A *punched card* in which all, or nearly all, *card* columns were punched and wherein several holes appeared in each column.

LAN. Local Area Network (acronym, pronounce letters individually). *See network, local area.*

Language. An intermediate step that helps humans to communicate with a computer. Arbitrary syntax and vocabulary are used to efficiently express particular relationships and to solve specific types of problems.

Large Scale Integration (LSI). A process for fabricating integrated circuits that have thousands of semiconductors such as diodes and transistors (approximately 20,000) on a single silicon chip. *See very large scale integration.*

Laser Printers. A printer technology that focuses laser beams to form images on photosensitive drums in a principle similar to that used in Xerographic office copiers. Laser printers now find use as output devices for computers. They are high speed, high quality, and have relatively high first costs in comparison to other printer technologies.

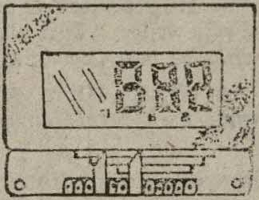
Last-In-First-Out. A procedure which is used to control an activity in which queues must be formed to control *sequential* proccesses.

Latch. A circuit which is able to maintain a stable condition until it is specifically energized to adopt an alternative condition.

Latency. The time delay which is required for an event to be initiated from the moment when the event is called.

Lattice File. A *file* within an *operating system* within which individual *records* can have more than one *owner*, and also themeselves are *owners* of more than one record.

LCD. Liquid Crystal Display (acronym, pronounce letters individually). A display technology which is often used in pocket- and briefcase-sized calculators, computers, and wristwatches, because of its thin profile. It causes high visibility in high illumination levels, but no visibility in low illumination levels.



LCD

Leader. 1. Refers to a length of unpunched paper that preceded the data recorded on a reel of *paper tape* Usually containing *feed holes* only. 2. Refers to a *record* that precedes a group of records and which identifies the group or provides data common to the group.

Leading Edge. Referring to a *punched card*—the edge that first entered the *card track* of a punched card machine.

Leading End. The end of a piece of *paper tape* that first entered a *paper tape reader*; *i.e.*, the end at which the first character of a message appeared.

Leapfrog Test. A test carried out by a *program* which is in *memory* and which carries out tests on different *locations* and then transfers itself to another *memory area* to continue the tests on other locations.

Least Frequently Used Memory. Areas in which *memory* is *allocated dynamically* in response to work load. The *operating system* is able to maintain a record of those areas of memory.

Least Significant Bit. Refers to the bit in the right-most position of a binary word or byte, which is the bit that could be eliminated with the least effect on the precision of the word. *See significant figures, most significant bit.*

LED. Light Emitting Diode (acronym, pronounce letters individually). A display device technology that is having high visibility at low illumination levels and low visibility in high illumination levels.

Left Shift. A *shift* operation in which the digits of a *word* have been displaced to the left. In an *arithmatical* shift this is having the effect of multiplication.

Leg. A *patch* in a *routine* or *subroutine.*

Length The numbers of *bits* or *characters* which are forming any *word, record* or other unit of data.

Letter. Refers to a character of the alphabet. Contrasted with *symbol* in a *character set.*

Letter Quality Printer. A printer using a ball, daisy wheel, or thimble element to produce one complete character representation with each stroke. It produces a print image similar to that of a traditional typewriter. It is also called "line quality" printer. *Contrast with dot matrix printer.*

Level. The position of an object within a physical or conceptual model For example, *high level language* contrasts with *low level language.*

Librarian. The person controlling the library in which all *magnetic files* and *programs* are kept, issues *data files* and maintains records of tape usage, including details of current *file generations* and their associated *reel numbers.*

Librarian Program. A *program* which forms a part of the *operating system* of a particular computer. The program is able to maintain a complete library of all the *routines* and *subroutines* required by the user including programs developed for the user's applications, *compilers, service routines*, and any special *packages*, or subroutines developed by the user or the computer manufacturer. Programs could be deleted, added or modified by the librarian program under the user's control. The complete library is stored on a *backing store* (*e.g.*, a *disk file*) so that required routines can be called into *memory* when it becomes necessary.

Library. Refers to a collection of programs or routines that are used frequently by application programs or system programs. For example, if five users frequently use the same routine, such as a square root function, then one copy of the routine is put into a "library" and accessed as required instead of each user having to program a square root function every time it is wanted.

Library Case. A container, usually made of plastic, for storing and protecting floppy disks.

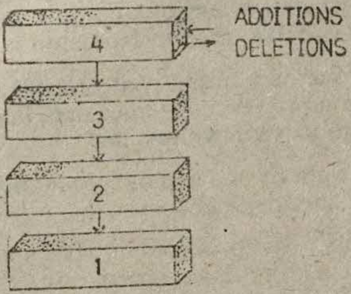
Library Program. A program which is available in the *program library.*

Library Software. All *programs* and *routines* which form part of the *library facilities* of a computer system.

Library Subroutine. A *subroutine* in the *program library.*

Library Tape. A *magnetic tape* having the *library software* of a computer system.

LIFO Stack. Last In First Out (acronym, pronounce as one word). A technique for organizing data so that the last entry placed in a stack of data items will be the first entry item to be retrieved. It is same as push down stack.



LIFO Stack

Light Pen. A stylus-shaped photosensitive pointing device that permits interactive communication between a computer user and a terminal screen. If the user touches the pen to a position on the screen, then that coordinate on the screen is input as data to the system.

Limited Integrator. An *integrator* in which two input signals are integrated as long as the corresponding output signal does not exceed specified limits.

Line. Term which is used for a channel in a *telecommunications* system.

Linear Programming. A means of finding the best possible solution to a problem which is expressed as a series of linear equations.

The solution must satisfy restrictions which are imposed on the variables being considered.

Linear Unit. A unit which is used in an *analog computer* in which the change in output, due to any change in one of two or more input variables, is proportional only to the change in that input and does not depend upon the values of the other prevailing inputs.

Line-At-A-Time Printer. Synonymous with *line printer.*

Line Coordination. Determining whether devices at both ends of a communication line are ready to talk.

Line Drawing. Representation of an object's image by entering a solid-line outline of surfaces. The mass or shape of the form between the lines will be inferred by the viewer. *Contrast with continuous tone image.*

Line Drawing, Three-Dimensional. Describes a three dimensional object's projection onto a two dimensional display surface. Techniques of perspective projection are used, similar to the projection of a real object through a lens onto the flat viewing glass of a camera.

Line Drawing, Two-Dimensional. Refers to a method of display that represents line drawings of a flat image, such as a building floor plan or a two-axes graph. No depth is suggested.

Line Feed. Refers to a mechanism, control, code, or character that causes paper in a printer to advance one line, or the cursor on a CRT screen to move down one line.

Line Height. The height of one line of type which is measured by the number of lines per inch.

Line Printer. A printer that produces one full line of type at a time and operates at a very high speed. Some line printers can output up to 3000 or more lines per minute (lpm).

Line Quality Printer. *See letter quality printer.*

Line Surge. A sudden high voltage condition that can damage equipment that does not have surge protection.

Link. Refers to a *branch instruction*, or an *address* in such an instruction, that is used specifically to *exit* from a *subroutine* so as to return to some desired point in a *main program.*

Linkage. A connexion between mechanical members used in a mechanical *analog computer* to do some arithmetic function.

Linked Subroutine. A *subroutine* not stored in the *main path* of a *program*, but entered via a *branch instruction* from the *main routine* and which executes a branch instruction to return control subsequently to the main routine.

Linking Loader. A program which is designed to link separately compiled program modules together into one consecutive memory configuration for execution. It is also called link editor.

Link Register. A *register*, often of single *bit* capacity, which provides for the joining of two *operands* together as in a *logical shift instruction.*

LISP. List Processing (acronym, pronounce as one word). An interpretive programming language whose instructions have been organized to define data relationship through use of pointers and tree structur s. The type of problems dealt with in artificial intelligence lend themselves to this kind of organization.

List. A set of items which are structured in a predesignated, logical order.

List Processing. Methods for processing data that are in list form. Usually, priority has been given to techniques such as chaining, altering the logical order of items without changing their physical locations in memory.

Literal Operands. *Operands*, usually in *source language instruction*, which specify precisely the value of a *constant* rather than an *address* in which the constant is stored.

Load-And-Go. Descriptive of a type of automatic coding in which the user's *source program* gets automatically translated into *machine code* and stored in the *central processor* ready to be carried out. Thus it is never necessary to create the *object program* on any external medium.

Loading Routine. A *routine* which exists permanently in *memory* to enable any *program* to get loaded into memory from an external medium.

Load Instruction. An *instruction* in a *program* which could move *data* to an *accumulator* or other *register* from a *memory location.*

Load Key. A hand-operated switch which was used on earlier computers to activate circuits for reading data or a *program* into *memory.*

Load Point. Refers to a physical marker at the beginning of a *reel* of *magnetic tape*, which is detected by *hardware* to ensure that the reel has been correctly positioned when the tape is first *loaded*, or after it has been rewound.

Local Area Network. A *network* which is designed to provide facilities for interuser communication within a single geographical location.

Local System Library. A *program library* having standard *software* available to a particular computer system.

Location Refers to the memory cell in which a data word or instruction is stored.

Location Counter. Refers to a value which is used within a *subroutine* for *addressing* a series of *locations*; the value being modified by *program* for addressing a separate location on each occasion the subroutine has been used.

Lock. In an *operating system* it refers to a method by which a *process* is given exclusive use of a *resource.*

Locked down. Means a condition in which an *area* of *virtual store* remains in a fixed position in *main store.*

Locking of Files. A process by which different *virtual machines* are not allowed from simultaneously *accessing* a *file.*

Lock-Out. 1. Refers to inhibit the activation of a *hardware* unit or a *routine* ; 2. A device which is used to safeguard against an attempted reference to a routine or area of equipment currently in use.

Logger. Any device which is able to record events over a period of time.

Logic. Refers to the science which deals with the formal principles of reasoning electronic data processing, the principles observed in the design of a computer system or of any particular unit.

Logical Comparison. The operation carried out if two *operands* or *keys* are examined to decide whether they are equal in value or to ascertain their relative size one to another.

Logical Decision. Refers to a choice between alternatives made by reference to some specified conditions. For example, alternative paths might be available in a *routine* and the selection of the required path might be done in accordance to whether an *intermediate result* were, say, negative or positive.

Logical Instruction. Any *instruction* specifying one of the *logical operations* (*e.g.*, an *and* instruction). Used in the widest sense to embrace those instructions which are not *arithmetical instructions*, *e.g.*, *comparing*, *shifting* or *branching* instructions.

Logical Record. A unit of information which contains a group of related fields, all of which are related to a specific computer application. However, the physical storage of the data need not correspond to the logical arrangement. The operating system assembles the separate components. No one particular location is inferred. For example, all information on a customer might be stored in different areas on disk, but together form a logical record. *Contrast with physical record.*

Logical Shift. Refers to a *shift operation* in which *digits* in a *word* get moved left or right in circular fashion, so that digits pushed out at one end of the word get re-introduced at the other.

Logical Symbol. A symbol which is used to represent one of the *logical operators* such as 'and', 'or', 'not', 'nand', etc.

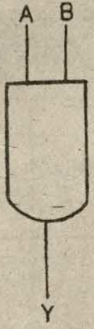
Logic Design. Refers to the description of the working of a computer or any associated unit, in which the functional parts of the system have been represented by *logical symbols.*

Logic Diagram. Refers to the representation of the design of any device or system in which graphic symbols have been used to represent the *logic elements* and their relationships.

Logic Element. A device used to carry out some specific *logical operation*; *e g.*, an *and element, or element, not element*, etc.

Logic Flowchart. 1. A chart which represents a system of *logical elements* and their relationships within the overall design of a system or *hardware* unit. 2. Refers to the representation of the various logical steps in any *program* or *routine* by means of a standard set of symbols.

Logic Gate. Refers to a component or circuit capable of performing a logic operation. *See Boolean algebra, AND, OR, NOR, NAND.*



THIS IS THE SYMBOLIC REPRESENTATION OF AN "AND" LOGIC GATE, AS IT WOULD APPEAR ON COMPUTER SCHEMATICS. SEE SCHEMATIC SYMBOLS.

Logic Gate

Logic Instruction. An instruction which uses the logical operations of 'or', 'and', 'nor', etc. A subset of the group of instructions which are concerned with data manipulation.

Logic Theory. The science that takes into account logical operations, which form the basis of computer operations. This simulation of simple logic uses electronic circuits to test hypotheses, which are indicated as either True or False by "on" or "off" in the electronic circuit. *See Boolean Algebra.*

Logo. Refers to a programming language and a language for learning programming. It was developed at Massachusetts Institute of Technology by Seymour Papert. Referred to as a "computer based learning environment," it was originally designed as an educational tool for young children. It is not an acronym; it gets derived from the Greek word for "word" or thought."

Longitudinal Check. A type of *parity check* which is carried out on a group of *characters* or *bits.*

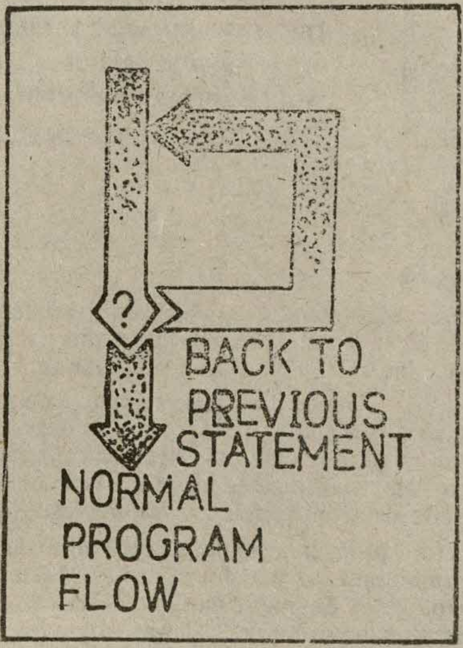
Longitudinal-Mode Delay Line. A *magneto-strictive delay line* in which the mode of operation has been found to depend on longitudinal vibrations in some magneto-strictive material.

Long Word. Refers to an arrangement of the *storage elements* in a computer, in which an extraordinary number of *bytes* have been taken as a unit for processing in a particular operation. An example is that computer organized with 16-bit *main memory words* may occasionally process *operands* as 32-bit words.

Look-Up. A programming technique which enables an item of data to be selected from an *array* or *table* in which the item is identified by a *key.*

Look-Up Table. Refers to a *array* of data which is so organized that it can be searched by a *routine* to retrieve information related to specified *keys.*

Loop. Refers to a series of instructions or one instruction in a program which gets repeated for a prescribed number of times, followed by a branch instruction which exists the program from the loop.



Loop

Loop Checking. Refers to a method which is sometimes used to check the accuracy of *data* transmitted over a *data-link*.

Loop Stop. A *loop* which is entered to stop a *program*, usually if some specific condition takes place requiring action by the operator.

Loosely Coupled Twin. Refers to a system in which two *processors* are used with *switches* to enable them to use common *peripheral units*.

Lower Curtate. Refers to certain *punching positions* of a *card column* (usually those without *zone* significance) which are grouped at the bottom of a *punched card*.

Low Level Filestore. A type of *filestore* which is used in an *operating system* to hold *physical files* not needed *on line*.

Low Level Language. Refers to a set of machine-dependent instructions. Examples include assembly languages and machine languages. The instructions are, or are close to being, in a form that the computer can execute without complex translations. Usually, faster, execution speeds or efficient memory storage are reasons for using low level languages. *Contrast with high level language*.

LP. Line Printer (acronym, pronounce letters individually).

Lpm. Lines per minute (acronym, pronounce letters individually).

Lps. Lines per second (acronym, pronounce letters individually).

LSI. Large Scale Integration (acronym, pronounce letters individually).

M

MAC. Acronym for Multi-Access Computing. *MAC mode*.

MAC Background Job. A *background job* which is run under an *operating system* in *batch mode*, either as an *interactive batch job* or as an ordinary *batch job* (in which the status of the job is ascertained through a terminal). *MAC mode*.

Machine. In industry vernacular, a word which is often used synonymously for a computer or a processing unit.

Machine Address. Synonymous with *absolute address*.

Machine Code. The coding system which is adopted in the design of a computer for representing the *instruction repertoire* of the computer. The various operations that can be undertaken are represented by numeric *function codes* and all *store locations* are allocated numbers to enable the *data* stored in such locations to be *addressed.* It is also known as computer code, *instruction code*, *instruction set*, order code.

Machine Cycle. A machine in which operations are carried out during a complete cycle. Applicable to any machine in which a cyclic pattern of events exists.

Machine Dependent. Capable of being used only on the machine for which it was originally designed.

Machine Error Refers to an error in the results of automatic processing which can be attributed to a machine malfunction rather than to a *software* or operating fault.

Machine Independent Language. A programming language used on any computer that is having the appropriate compiler or interpreter. Programs written in high level languages are theoretically machine independent. However, in practice they often require some modifications so as to operate on equipment of different manufacturers. Assembly languages have been never machine independent; their instructions have been designed exclusively for a specific type of processor.

Machine Independent. The term used for describing a *program* or procedure which is expressed without any reference to any particular *machine coding* system. The procedure is designed in terms of the logical requirements of the problem.

Machine Instruction. An *instruction* which is written in terms of a computer's *machine code i.e.*, one obeyed directly by the machine without translation.

Machine Instruction Code. Synonymous with *machine code.*

Machine Interruption. Refers to break in the processing of a *program* which is caused by some event and detected by the computer *hardware.* For example, some automatic checking operation may reveal a *parity error.*

Machine Language. Refers to the language as its lowest level (in binary form), into which data and programs must ultimately get translated before the machine can use it and execute any instructions.

00111110 01011000 11011011 00000011 11100110

Machine Language

Machine Learning. Refers to the ability of a machine for improving its performance with repeated experience of particular problems; *i.e.*, *artifical intelligence.*

Machine Logic. Refers to the design of a computer in respect of the way in which its various elements are interactive.

Machine Operation. Refers to a predetermined group of activities which a machine is built to undertake, *e.g., addition.*

Machine Operator. The person who is londing *programs* and data into a computer or who is manipulating the *console* controls to achieve the running of a program or *suite* of programs.

Machine Processible Form. Describing any data which is arranged in some medium and can be accepted and processed by an *automatic data processing* machine.

Machine Run. Refers to a complete *routine*, or set of interlinked routines, which would normally be carried out on a computer without major intervention.

Machine Script. Any data which is represented in *machine code* form.

Machine Sensible. Related to data which is recorded in such a way that it can be sensed or read by an *automatic data processing* machine.

Machine-Spoilt Work Time. Refers to the time spent in processing data where the results have *errors* because of a machine fault.

Machine Word. Refers to a physical location in *memory*, which could be *addressed* as a single unit but which will have a predetermined standard number of *characters* or *digit positions.* The *word* is a standard unit of transfer for computers having *fixed word-length*, and usually operations are carrie out in *parallel mode* when carrying out any specified function; *i.e.*, all digit positions have been processed simultaneously.

MAC Mode. A method which uses an *operating system* in which *jobs* are submitted from *remote terminals* and are then carried out in *conversational mode.* MAC represents an acronym for *multi-access* computing.

Macro. 1. An abbreviation used for *macroinstruction.* 2. In an *operating system*, referred to the name of a set of operating system *contral language* statements which can be activated collectively by giving the macro name.

Macro Assembler. A special assembler that is able to recognize key words in the assembly code and expands them into their full instruction set. The user defines the macro key words and their corresponding instruction set

Macro Assembly Program. An *assembly program* in which concise *instruction* statements are able to generate procedures having several *machine code* instructions for each source statement. Such an assembler may also allow the *segmentation* of large programs and facilities for tracing programming errors.

Macro Code. Synonymous with *macroinstruction.*

Macro-Coding. Refers to the use of *macroinstructions* in the writing of a program.

Macro Flowchart. A chart which is used in designing the logic of a particular routine, in which the various *segments* and *subroutines* of a program have been represented by blocks. In such a chart no attempt is made to specify detailed programming tactics, this being the province of the programmer.

Macro Instructions. (1) Refers to a frequently used set of predefined instructions which are designed to carry out a specific operation. The function is associated with one code word which is defined by the user. Code words (macros) have been inserted with in the main program where needed. The code word references the predefined macro instruction set (body), which is a separate machine language routine or assembly routine. By using a macro, a user can define a recurring task just once and then, when that task is called for, the macro could be substituted. This will shorten program length, but a special macro assembly program is needed to expand the macro into its body and into machine code. The macro is a shared resource in that its access does not restrict to one program.

A macro differs from a subroutine in that if a macro program goes through the translation (assembly) process, the code for the macro key word is actually inserted into the program. Therefore, if the program is executed those "substituted statements" are read sequentially and there is no transfer of control to any other area of memory. A subroutine, on the other hand, employs a call statement which is executed so as to transfer control to a different area.

(2) In word processing, the macro can be a word or phrase which is called up if a code word is used. The code word is sometimes known as a "token".

Macroinstruction. A single *instruction* which is written as part of a *source language*, and when compiled into a *machine code* program will generate several machine code instructions.

Macrologic. Certain logical devices are known as chip silces. They hold *microprograms* which carry out basic *instructions* as needed in a microprocessor.

Macroprogram. It consists of a series of *macroinstructions* (*statements* in *assembly language*), each of which invokes a series of *microinstructions* which are stored within a microprocessor control unit.

Macroprogramming. Refers to the *programming* of a problem in which all statements have been written in terms of *macroinstructions*; usually where some *assembly system* or *package* is available to carry out translation of the macroinstructions into *machine code*.

MAC Sub-System. Means a part of an *operating system* which is able to control work submitted in *MAC mode.*

Magazine. 1. An input *hopper* which is able to hold documents or cards and presents them to a feed mechanism for reading or punching. 2. A device which forms part of a *magnetic card file* and holds *magnetic cards* and presents them for reading or selection.

Mag Card. Abbreviation for "magnetic card," a plastic, flexible card about 3 inches by 7 inches with a magnetized surface used for data storage.

Magnetic Card. A card which has a magnetizable surface upon which data has been recorded by the energizing of certain parts of the surface, thereby providing a storage medium.

Magnetic Card File. A *direct access storage device* in which individual *buckets* of data have been stored upon *magnetic cards* held in one or more *magazines.* The cards, once addressed, get selected from the magazine and get transported at high speed past a *read/write head.*

Magnetic Cell. A storage *cell* in which the two possible values of one *binary digit* have been represented by different magnetic flux patterns. A magnetic cell may have one or more storage *cores*, or of a small part of a larger piece of perforated ferromagnetic material known as an aperture plate.

Magnetic Core. Refers to a small ring of ferromagnetic material which could be polarized by electric currents applied to wires wrapped around it. The magnetic core was thus capable of assuming two states and could be used as a switching device, or as a storage medium. These devices found use extensively for the *memory* of computers.

Magnetic Core Storage. Refers to a large array of *magnetic cores* which are arranged in *matrices* to form the *memory* of a computer. Each individual core was capable of assuming two states and some cores could be assigned as storage *locations* for information to be held in *binary coded form*, while others could carry out *switching* or *gating* functions.

Magnetic Disk. A storage device. It consists of a number of flat circular plates, eash coated on both surfaces with some magnetizable material. There are a number of *tracks* on each surface and data could be read from or written to these tracks by means of *read/write heads.*

Magnetic Disk File. A *file* of data held on a *magnetic disk.*

Magnetic Disk, Layout. A schematic representation of common space allocations on a magnetic disk.

Magnetic Drum. A storage device. It consists of a cylinder which is coated with magnetizable material; the cylinder is continuously rotated past a series of *read/write heads* which have been arranged to coincide with recording *tracks* on the surface of the cylinder.

Magnetic Head. An electromagnet which is used to read, record or erase polarized spots on a magnetic medium like *magnetic tape, magnetic disk* or *magnetic drum.* Examples include *read head, write head* and *read/write head.*

Magnetic Ink. Ink having particles of magnetizable material, which could be energized to facilitate automatic reading of printed characters.

Magnetic Ink Character Reader. A *character reader* which is able to read characters printed in magnetized metallic ink by employing *magnetic ink character recognition* techniques.

Magnetic Ink Character Recognition. The technology which is related to the recording of information on document by using *magnetized ink characters* and the automatic recognition of such characters by using machines.

Magnetic Ink Document Reader. A device which is able to read specified fields of *magnetized ink characters* from documents and translate the information read into a coded format, usually for direct insertion into an *input area* of a computer's *core storage.*

Magnetic Ink Document Sorter/Reader. A machine which is capable of reading information from documents having *magnetized ink characters* and of sorting the documents into order in accordance to the digits recorded in a specified *field.*

Magnetic Memory. Refers to any *storage device* which operates by using principles of electro-magnetism.

Magnetic Tape. A tape or ribbon coated with a magnetic material on which information may be placed in the form of magnetically polarized spots.

Magnetic Tape Deck. Refers to a complete *tape transport* and its associated *read/write heads.* It is capable of either reading from or writing to a *magnetic tape file.*

Magnetic Tape File. Refers to a *reel* of *magnetic tape* having *records* of information which are arranged in an ordered sequence.

Magnetic Tape Group. A set of *magnetic tape decks* which are built into a single cabinet, each deck capable of independent operation but sometimes arranged to share one or more *interface channels* for communication with a *central processor.*

Magnetic Tape Head The part of a *magnetic tape deck* which is able to read or write information to the tape. Some tape decks possess a single *read/write head* but others possess separate heads for reading and writing; these are known as two gap heads.

Magnetic Tape Librarian. The person who is able to store *magnetic tape files* ready for use on a computer.

Magnetic Tape Parity. An automatic checking technique used when *reading* or *writing* data to *magnetic tape.*

Magnetic Tape Plotting System. A system in which data recorded on *magnetic tape* has been used to develop an X-Y plot for the purpose of controlling a *digital incremental plotter.*

Magnetic Tape Reader. Means a device for sensing data recorded as a series of magnetized spots on *magnetic tape.*

Magnetic Tape Streamer. A *magnetic tape deck* which is used to back up a *magnetic disk.*

Magnetic Tape System. High capacity hardware storage including tape drive and control circuitry. Because of the tape's serial access (in order to get to any one point you must start at the beginning and cycle through), it has been well suited for large batches of stored information that do not need frequent access, or for applications where most of the records do not require to be accessed.

Magnetic Wire Store. A storage device in which data has been recorded on a thin moving wire by an electro-magnetic *read/write head.*

Magnetized Ink Character. A character printed on a document by means of ink which gets impregnated with a magnetizable material.

Magneto-Strictive Acoustic Delay Line. Refers to an *acoustic delay line* in which certain materials exhibiting the *magneto-strictive effect* have been used to convert electrical signals to sonic waves and vice versa.

Mailbox. 1. A computer application which is designed to offer a *messaging* service between members for a *closed user group.* 2. A process, perhaps in an *operating system,* used to exchange data between co-operating processes.

Mail Merge. Refers to a procedure for combining names and addresses from one record file with correspondence from another record file for mailing purposes. This term is also used for software that accomplishes this task.

Mainframe. 1. A large computer in both size and capacity; 2. The housing for computer circuit boards; 3. The main portion of a computer containing the central processing unit (CPU), memory, input/output, and power pack.

Main Memory. Refers to immediately accessible memory for programs and data storage. It normally includes ROM and RAM, but excludes mass storage devices. Main memory is integral to the computer. Also known as internal memory.

Main Program. Refers to the central part of a *program* which usually transfers control to other *subroutines* in accordance to the nature of the data being processed or dependent on conditions arising during the operation of the program. The central framework on which the various sections or subroutines get mounted.

Main Storage. The *store* from which *instructions* get executed; usually the fastest store of a computer.

Main Store. Refers to the principal fast or *immediate access store* of a machine.

Main Store Quota. In an *operating system* it refers to the area of *main store* made available by the *scheduling system* to a process when it is *rolled in.*

Maintenance Routine. A *routine* which is specially designed to assist a service engineer in carrying out routine *preventive maintenance.*

Major. Describing the relative significance of a *key* or *control data* which is stored in a computer *record* or in a *punched card.*

Major Control Cycles. On a *punched card tabulator,* they refer to a series of cotrol cycles that were automatically initiated during the processing of a file of punched cards because of detecting a change of major *control data.*

Majority Element. A *logic element* having several *input* signals and which can be switched to provide an *output* signal only when a majority of the *weighted input signals* are present.

Malfunction Routine. A *routine* which is designed to trace a fault in a computer's *hardware* or to assist in diagnosing an error in a *program.*

Management Information System. (MIS). Provides business information helpful to managers including inventory, sales, payroll, accounts payable and receivable.

Manipulation. Refers to the act of changing or arranging data or their formate to ease processing or arrive at a problem solution.

Mantissa. Refers to the significant digits of a number written in scientific notation. For example, in the number, 1.279×10^{12}, the mantissa is 1.279.

Manual Control. Refers to a *program* or system in which some aspect of the work has been controlled by the computer operator from the computer *console.*

Manual Input. Means the entry of data into a system or *program* directly, by using a *keyboard* device.

Manual Input Unit Any device which makes an operator to inject data into a system directly without using some intermediate medium such as *punched cards* or *paper tape.*

Manual Operation. Any *data processing* operation which is carried out without the use of automatic equipment; *e.g.*, the pulling of documents or *punched cards* from a file.

Manual (Operations). Refers to the status of a *peripheral unit* when it is *off-line* and hence cannot be controlled by an *operating system*.

Manual Word Generator. Refers to a device by means of which an operator can set up a *word* of information for direct entry into *memory*.

Also known as manual word unit.

Map. A listing indicating where different elements of memory are laid out, such as the operating system, libraries, etc.

Mapping. (1) Transforming one set of information to another set; (2) Setting up the correspondence between one set of information and another set.

Marginal Testing. A test carried out on equipment to diagnose some intermittent fault or to see whether the equipment operates within specified operating tolerances.

Margin-punched Card. Refers to a card which got punched with holes in a comparatively narrow strip along one edge of the card, leaving the centre free for written information. The punching *code* often resembled the type of punching used in 5, 6 or 7 *track paper tape.*

Mark. 1. A *character* which is used to identify the end of a set of data, *e.g.*, *tape mark*, *group marks*. 2. In *telegraphic communition*, refers to a positive pulse which represents an element in a *character code*.

Mark-Control. *See tape mark.*

Mark Hold. In telegraphic circuits, a steady signal which is transmitted to signify that no information is being transferred.

Mark Scanning. Refers to a process in which marks made in predetermined positions on documents have been read, optically and interpreted as *digits* or *characters* for direct entry into a computer, or for punching into some other medium.

Mark Scanning Document. A document which is specially printed with reference columns to enable marks to be made for subsequent reading by a *mark scanning* device.

Mark Sense Cards. *Punched cards* which are divided into *card columns* to facilitate *mark sensing*. Mark sense columns form usually the width of two or three normal punching columns.

Mark Sensing. Refers to the automatic sensing of marks which are made with some conductive material on predetermined positions of a *punched card*. The marks were made, usually with a graphite pencil lead, in columns to represent digits, in much the same way as holes in *card columns* represent digits.

Mark-Space Multiplier. A *multiplier* which is used in *analog computers* wherein an input voltage is employed to regulate the *mark-to-space ratio* of a square wave.

Mark to-Space Ratio. Refers to a ratio of the duration of the positive and negative cycles of a square wave. A mark is a positive cycle while a space is a negative cycle.

Mask. (1) In integrated circuit (IC) technology, a template, which is usually etched on glass and used to define areas of the chip on the silicon wafer. Masks are used for the diffusion, oxidation, and metalizing steps in the process of manufacturing chips; (2) In computer logic, it refers to a pattern of bits which are used to selectively set, ignore, or clear bits within the word or bit pattern that is to be operated upon.

Masking. Refers to the technique of using a *mask* to operate on the *bit pattern* of some other *operand*, so as to alter or isolate certain *bit positions*.

Mass Data. Refers to data in such volume that it cannot be stored in *memory* at one time, *e.g.*, data stored on a *magnetic disk file.*

Mass Storage. Refers to the large-capacity (megabytes, gigabytes) secondary storage systems. Typical mass storage devices include recording tape and magnetic disks. Also called external memory.

Master Card. A *punched card* which is holding any fixed information about a group of cards or a whole card file. It is usually appearing as the first or last card of the group.

Master Clock. In an electronic computer, it refers to a device which generates clock pulses to maintain the basic time frequency of the electronic circuit.

Master Control Routine. 1. A *routine* forming part of a *program* which consists of a series of subroutines. The master control routine is able to control the linking of the other subroutines and may call the various *segments* of the program into *memory* as required. 2. Also use for describing a program which controls the operation of a *hardware system.*

Master Console. A *console* which is exercising overall control over a computer system.

Master Data. Refer to those *data elements* of a *record* which seldom change; *e g.*, descriptive data such as personnel number, stock item number.

Master Instruction Tape. A *magnetic tape* maintaining all the *routines* required for a particular *suite* of *programs.*

Master Library Tape. A *reel* of *magnetic tap* having all the *programs* and major *subroutines* which are required in a particular data processing centre. During operation of the computer this tape may remain permanently *loaded* on a *magnetic tape deck* : at the beginning of any *run* the computer operator calls into *memory* the particular program required.

Master Record. In a *magnetic tape* system, it refers to the latest version of any particular *record* which is carried forward to the next processing *run*.

Match. A data processing operation which is used to compare items of data for identity. Sequences have been matched against each other on the basis of a given key.

Matching. Refers to the technique of comparing the *keys* of two *records* to select items for a particular stage of processing or to reject invalid records.

Mathematical Subroutine. A *subroutine* which is written to carry out some mathematical function; *e.g.*, square root, sine, tangent, etc.

Matrix. 1. The term is more loosely applied in data processing to any table of items. 2. Sometimes it refers to an array of circuit elements; *e.g.*, diodes in a conversion matix for generating one set of coded signals from another.

Matrix Printer. Synonymous with *needle printer*.

Matrix Store. Refers to a *store* in which a particular *location* or circuit element have been addressed by the use of coordinates. Also known as coordinate store.

Mattel. A manufacturer of small computer systems and computer games.

MB. Megabytes (acronym, pronounce letters individually).

Mean Repair Time. In a given time period it refers to the ratio of time spent in *corrective maintenance* of a unit to the number of unit *failures*.

Mean Time Between Failures. In a given time period, it refers to the ratio of the total time in the period to the number of *failures* in the period.

Mean Time to Repair. Synonymous with *mean repair time*.

Media Eraser. An electromagnetic device which could completely erase stored data from any flexible magnetic media—tape, diskette, cassette or data catridge. *See degausser*.

Medium. In input medium it refers to the particular material in which data gets recorded for the purpose of input to *memory*. Examples of input media include *punched cards*, *paper tape*, *magnetic tape*, *magnetic ink* documents or documents bearing characters for *optical character recognition*.

Medium Scale Integration. Refers to a level of microelectronic technology in which up to a 1000 *logic gates* may exist on a single *chip*. The term *large scale integration* (LSI) is referring to more than 1000 gates per chip, and the term *very large scale integration* (VLSI) is referring to more than 10,000 gates per chip.

Mega. Prefix which means one million.

Megabyte. (MB or M-BYTE) 1024 Kilobytes, or 1024×1024 bytes.

Membrane Keyboard. A type of keyboard which is composed of a single sheet of semi-flexible plastic material with a conductive rear surface. When flexed approximately 0 005 inch with slight finger pressure, contact results and a signal gets trasmitted. *See pressure sensitive keyboard.*

Memory. A temporary storage area which is used for information (programs and data) in binary form.

Memory Address. Refers to a *binary* numeric code which is given to a *memory location* so that the location can be selected for *reading* or *writing* under program control.

Memory Address Register. A *register* which is used in the addressing of *operands* in other *locations* of *store.* The *address* component of each *instruction* has been stored in a memory address register while the instruction has been executed.

Memory Buffer Register. Refers to a special *register* through which all data entering or leaving *memory* must pass. Thus the register is acting as a *buffer store* for facilitating transfers of data to and from the memory and *peripheral units.*

Memory Capacity. Means the number of units of data that could be stored in *memory.* It is expressed in terms of the number of *locations* available; examples are 32,000 24-bit *words,* 1 million *binary digits,* 120,000 6-bit *characters,* 1 *megabyte.*

Memory Cycle. 1. Refers to the complete sequence of operations which are required to insert or extract a unit of data from *memory.* 2. The time taken to carry out a complete sequence of operations.

Memory Fill. A technique which is able to bring to notice the fact that a *program* is trying to obtain *instructions* from forbidden *locations* or *registers.* The registers concerned become filled with predetermined characters which signal an error condition if addressed.

Memory Guard. Refers to a *hardware* or *software* device which does not allow a program from *addressing* specified *locations* in *internal store.*

Memory, Internal. Synonymous with *internal store.*

Memory Management. A method that is using both hardware and software techniques to efficiently control and allocate memory resources.

Memory Mapped I/O. Refers to a technique in which addresses placed in peripheral devices "appear" to the processor as memory locations. The processor is able to send data to, or receive data from, the peripheral devices using the same instructions it uses to access memory. The main advantage is that existing processor instructions may serve this dual purpose. The disadvantage is that this procedure decreases the range of memory locations used for programs and data.

Memory Mapped Video. Refers to a system in CRT high resolution graphics displays in which each pixel position on the screen is having a unique memory location or locations assigned to it. This is for storing data describing updated display attributes for that particular pixel, such as on-off, blinking, color, etc.

Memory Mapping. A listing of memory addresses which shows how the system memory has been allocated among various devices or programs.

Memory Module. In designing internal *memory* systems for computers a number of chips are to be arranged to support the required capacity. A group of chips arranged for this purpose is known as a memory module.

Memory Overlays. Refers to the utilization of *memory* by various sections or *segments* of a *program*; *e.g.*, where the program is having such size that it cannot conveniently be held in its entirely in *main memory* at any one time.

Memory Parity Bit. Refers to an extra *bit* attached to each *memory storage lacation*, so as to allow *error detection* (and perhaps *error correction*) when monitoring internal data transfers within a computer. Computer *architectures* for *mainframe* and *mini computers* invariably employ this parity checking system, but some microcomputers do not.

Memory Power. Refers to the efficiency of a particular *memory* design in respect of its rate of processing; *e.g.*, a *store* is said to have a cycle speed of .0 *nanoseconds* one *microsecond*.

Memory Print. The output of the contents of *memory locations* to a *printer memory dump*.

Memory Protect. A feature which is designed to prevent accidental modification of the operating system. It separates the operating system from the user programs. This hardware protection of certain areas of memory does not allow unauthorized reading from, or writing to, designated areas.

Menu. Refers to a program-generated list of options which is usually presented on the display screen, to which the user can refer and from which the user can select so as to execute desired procedures.

Menu Selection. Refers to a method of using a *terminal* to *display* a list of optional facilities which can be selected by the *user* so as to carry out different functions in a system.

Merge. Refers to the combination of records from two or more ordered input files into a single, consecutively ordered output file.

Message. Refers to any combination of *characters* and *symbols* which are designed to communicate information from one point to another. For example, a set of *records* transmitted over a *data link* between one computer and another.

Message Display Console. Refers to a *console* unit fitted with a *visual display tube* to permit data to be displayed in character form. If this is fitted to a *central processor*, data stored in *memory* could be selected and displayed as a page. For example, it is possible to display 20 lines each of 80 character positions using a full *character repertoire* of 64 characters.

Message Exchange. A *hardware* device which forms part of a *data link* It carries out certain routine switching functions to relieve the computer of these tasks.

Message Queuing. In a *data communications* system, it refers to a technique for controlling the way in which messages are handled.

Message Routing. A function carried out by *hardware* or *software* in a *data communications* system; messages received in a central computer have to be examined and routed to the destination required.

Message Switching System. The term used for *data communications* system in which a central computer is able to service several distant terminals, receiving *messages* from them and storing them until they get transmitted to some desired destination.

MHz. Abbreviation of megahertz.

MICR. Acronym for *Magnetic Ink Character Recognition.*

Micro. A prefix which denotes one millionth (10^{-6}), as in *microsecond.*

Micro Code. Synonymous with *microinstruction.*

Micro-Coding. Refers to the process of simulating a program *instruction* not normally part of an *instruction set* by using a series of simple program steps. A section of micro-coding forms a *macroinstruction.*

Microcomputer Architecture. The architecture of a microcomputer is generally designated in terms of bits—8 bit, 16 bit, 32 bit, etc.—revealing the size of the "chunk" of data that could be handled in one execution (read, write, move, etc) and the number of memory cells in which data could be stored. An 8-bit machine is able to move 8 bits of data in a machine instruction; a 16-bit machine is able to move 16 bits, etc. The higher the number of bits defined in the microcomputer architecture, the faster the machine will undertake most instructions. Software created on an 8-bit machine usually will fail to run on a

16-bit machine. *See microcomputer, 8-bit; microcomputer, 8/16 bit; microcomputer, 16-bit; microcomputer, 16/32 bit; word size.*

Microcomputer, 8-Bit. A computer system which utilises a central processing unit that is having 8-bit word size. *See microcomputer architecture.*

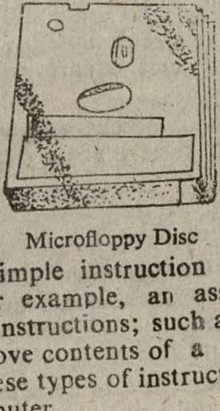
Microcomputer, 8/16. A system using a processor with a 16-bit word size, but which multiplexes data across an external 8-line data bus. The larger word size would increase the amount of memory which can be addressed, and allows more precise and complex instruction sets. *See microcomputer architecture.*

Microcomputer, 16-Bit, A computer which uses a central processing unit (CPU) that is having 16 bit word size. *See microcomputer architecture.*

Microcomputer, 16/32 Bit. A system using a 32-bit processor, but which multiplexes data across an external 16-line data bus. The larger word size offers more precise calculation and complex instructions. The larger data bus allows faster transfer of data to and from storage. *See microcomputer architects.*

Microcomputer System. The term used for a complete small system which includes the central processing unit (CPU), input/output interfaces and devices, memory and power supply, alphanumeric keyboard, CRT display and mass memory device. They are generally smaller than a minicomputer in physical size, word size, memory size and other factors, they are single-user systems referred to as "personal" computers and "desktop" computers. A range of storage capacities are available, and this capacity partially depends on word size (8-bit, 16-bit, or 32-bit).

Microfloppy Disc. A floppy disc which is characterized by a 3-inch or 3.5-inch square disc jacket. *Contrast with mini-disc* (5.25 *inch*), *or floppy disc* (*8 inch*).



Microfloppy Disc

Micro Instructions A simple instruction which represents one step in a process. For example, an assembly instruction might comprise of micro instructions; such as, move data in register to accumulator, move contents of a memory location to the data bus, etc. These types of instructions have been internal to the specific computer.

Microprocessor. A central processing unit which consists of an arithmetic logic unit (ALU) and a control unit (CU) organized on one or more chips by means of large scale integration (LSI) technology. A microprocessor find use as the central processing unit (CPU) of a microcomputer system and is often known as the microprocessor unit. It is able to accomplish its results by moving data around or by performing calculations.

Microprocessor, 8-Bit. A microprocessor having 8-bit registers manipulates data that is in the form of 8-bit words.

Microprocessor, 16-Bit. A microprocessor having 16-bit word size. The ability to handle words which are twice as big (compared to the standard 8-bit word size) implies that it can process twice as much data at a time. It also provides greater speed and precision (accurate to a greater number of significant figures) than an 8-bit processor. 16-bit processors are also having more powerful and complex instruction sets.

Microprocessor Unit. (MPU). *See microprocessor.*

Microprogram. Refers to a sequence which is written in micro instructions and stored in the control unit of the microprocessor unit. When it is executed, it will under take the function of various micro instructions. The microprogram references the control unit directly but it is not accessible to the user.

Microworld. Refers to a well-defined but limited learning environment in which interesting happenings take place and important ideas have been offered. A microworld can have other microworlds within.

Minicomputer. Refer to a faster, larger, more expensive computer than the micro. However, the demarcation line between minicomputers and microcomputers is becoming less distinct. The term "mini" is generally used to refer to a 16 bit machine, while a "micro" was an 8-bit machine. Today 16 bit microcomputers and 32 bit minicomputers are available.

Mini-Disk A floppy disk size designation which is characterized by its 5.25 inch (13.3 cm) square protective jacket. It is also known as diskette.

Minimum Accese Code. A coding system which is able to minimize the time required to receive any required unit of data from a *storage device.*

Minimum Access Coding. Refers to the technique of *programming* computers so as to reduce *access time* to a minimum.

Minor Control Change. On a *punched card tabulator* it refers to the action of suspending card feeding and initiating *minor cycles* because of detecting the difference in minor *control data* between one card and the rest.

Minor Cycle. 1. On a *punched card tabulator*, it refers to a cycle of machine operations taking place during a *minor control change.*

2. In any *storage device*, it refers to the interval between corresponding positions of successive *words*.

Minuend. One of the *operands* which is used in subtraction, the quantity from which another quantity has been subtracted.

Minus Zone. The *character* or *digit position* which is displaying the algebraic sign of an *operand.*

MIS. Management Information System (acronym, pronounce letters individually).

Mnemonic. Refers to an easily remembered word which is chosen to represent another word, phrase or concept that is more difficult to remember.

Mnemonic Operation Code. In *symbolic programming languages* it refers to the *operation code* forming part of each *instruction* which is represented by some symbolic code easier tor the programmer to remember than the numeric code forming part of the basic *machine code.* For example, the operation *multiplication* could be represented as MULT.

Mode. Refers to a particular method of operation for a *hardware* or *software* device; for example, a particular unit might be capable of operating in, say, *binary mode* or *character mode.*

Model. Refers to the representation of a system, device or process in a mathematical form.

Modem. Means modulator-demodulator (acronym, pronounce as one word). A device that connects peripherals, and that converts and reconverts digital signals from a computer into tone variations (in serial form) for transmission over standard telephone.

Modem Bypass. A special cable that is able to allow a local device to be connected directly to a modem communication port. It is employed when modem communication is not necessary but operation of the local device is. An example is that the user may not wish to disconnect the modem, but might have need of another terminal. The terminal could be attached to the bypass and then disconnected for later use of the modem.

Modem Communications. Refers to the process of using modems for communication between computers, or between computers and peripherals. An example is that data flows from a computer through a modem, where digital signals get converted to audio signals, then across telephone lines to another modem that is able to reconvert the audio information into digital signals that can be used by the receiving device or terminal.

Modem, Direct Connect. Refers to a type of modem which is connected electrically (by means of a plug) to the telephone system, thereby eliminating the need for an acoustic coupler connection, or telephone instrument.

Modification. The technique which is used for altering *instruction* and *addresses* in a *program* by treating them as data and applying *arithmetical* and *logical operations* to them.

Modifier. An item of data which is used to alter a *program instruction* so that the instruction, sometimes known as a *bas c instruction*, can be used repetitively for executing a different operation on each occasion, *e g*, the *operand address* could be modified to operate upon successive item in an *arry* of data.

Modifier Register. A *register* into which a *modifier* can be loaded so as to effect the *modification* of a *basic instruction*. It is also known as *index register*.

Modular. Refers to a method of constructing a *hardware* or *sofiware* system by using standard compatible units. In this way it is possible to built up a wide range of *configurations* with combinations of the standard units.

Modularity. Refers to the condition which is exhibited by any *hardware* or *sofiware* system that allows the subsequent expansion of the system by the addition of standard *modular* units.

Modular Programming. A technique which is used in *programming* to simplify the tasks of developing and maintaining large *suites* of programs. The aim of modular programming methods is to achieve two main goals; speed and efficiency of *debugging* and ease of *maintenance* of the programs in a suite.

The basis underlying modular programming techniques is to divide each program at the planning stage into a number of logical parts or *modules*. Each module is corresponding to a particular program function and can be treated as a separate entity. A number of different programs may in practice share certain common modules. Each individual module has been found to be relatively simple to specify, write and test. Changing requirements can be realised by simply changing existing modules or adding new modules to the system. This main future is the ability of the user to choose different *languages* for different modules, for example mixing *COBOL*, *FORTRAN* and possibly a *low level language* within a single program.

Modulation Code. A coded signal which is used to modulate the frequency or *amplitude* of a carrier wave.

Modulator. A device which superimposes a data signal on a carrier wave in accordance to a predetermined method, *modulation*.

Module. A building block that can be used to create a larger whole. In software, a subroutine can be regarded as a module; in hardware, any device that can be combined with others to create a larger system.

Module Key. A *key* which is used to identify and access an area in a *module* in *filestore*.

Modulo. *n* **check.** A method which is used for checking the validity of a numeric *operand.* in which the number is divided by *n* to produce a remainder (*modulo*). The remainder then accompanies the result as a *check digit* and subsequently the number may again be divided by *n* and the remainder has been compared with the previously calculated check digit. When $n=9$, it is known as *casting-out-nines*.

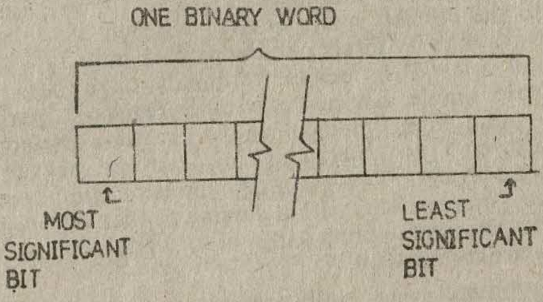
Monadic Operation. A processing operation which is done upon one *operand*.

Monitor Routine. 1. Any *routine* which is able to observe the progress of work in a computer system. 2. More specifically, refers to a routine designed to supervise and control the operation of *programs* in the computer, performing the functions of an *excutive program.*

Monitor System. A collection of *routines* which are stored permanently in *memory* and are able to control the operation of users' *programs* and coordinate the various *hardware* and *sofiware* activities.

MOS. Metal Oxide Semiconductor (acronym, pronounce as one word). The high density integrated circuit technology which is used for most large scale integration (LSI) devices, including microprocessors.

Most Significant Bit. Refers to the bit in the left-most position of a binary word. *See least significant bit, significant figures.*



Most Significant Bit

Most Significant Character. Refers to the character in the extreme left-hand position of a group of significant *character* in *positional representation.*

Motherboard. The term used for a main hardware board within the system. It gets equipped with female connectors into which all the circuit boards could be plugged. Also called a "backplane".

Motorola. Manufacturers of electronic equipment, such as the Motorola 6800, 6809, and M6800 microprocessors.

Mouse. A cursor positioning device which is manipulated by hand. It moves the screen cursor in the same direction as the movement created if the mouse gets rolled on any flat surface. *See trackball.*

MPU. Means Micro Processor Unit (acronym, pronounce letters individually). *See microprocessor.*

MS. Means millisecond (acronym, pronounce letters individually). One thousandth of a second.

MSI. Medium Scale Integration (acronym, pronounce letters individually). A term used for describing the amount, or density, of integrated circuitry in a given area. MSI has been more complex or densely packed than small-scale integration, and less dense than large scale integration.

MSX. A microcomputer operating system.

MTBF. Mean Time Between Failures (acronym, pronounce letters individually). Also, refers to the average time between failures for any device.

MTTR. Abbreviation of *mean time to repair.* Refers to *mean repair time.*

Multi-Access. A multi-access system is defined as one that allows a number of people to carry out the interactive role usually associated with an *operators' console.* The access points (which may be a few only or hundreds in number) have been generally linked to the *central processor* . by switched *data transmission* lines rather than by direct cabling as with most types of *on-line peripheral unit.* The remote terminals have been found to range from simple devices like cash registers, perhaps with an automatic input machanism for reading pre-coded data, through *console typewriters* and *visual display units* to complete *satellite processors.* Two main categories of multi-access system are known one operates with a single complex of *programs* and the other permits the processing of as many diverse programs as there are terminals.

Systems employing multi-access terminals in support of a common series of tasks are mainly *real time* applications, like airline seat reservation, banking, stock exchange dealing, crime detection and weather forecasting. Essentially, multi-access has been used to facilitate communications.

Multi-Address Instruction. An *instruction* specifying the *address* of more than one *operand.*

Multi-Aspect Search. Refers to a search which is conduced on a series of items using various logical combinations of the elements within each item for identifying and selecting the items required.

Multi-Cycle Feeding. A system which is used on *punched card tabulators* in which several lines of print could be obtained from a single card.

Multiple-Length Arithmetic. Arithmetic which is carried out by using two or more machine *words* to *store* each *operand*, usually to attain greater precision in the result, *e.g.*, by storing a decimal function in two words, one is holding the *integer* and another the fractional part.

Multiple-Length Number. In a *word oriented memory*, any *operand* exceeding the capacity of one word.

Multiple-Length Working. Any processing in which we use two or more *words* to *store* a number.

Multiple Punching. In *punched card* practice, it refers to the punching of more than two holes in any single *card column*.

Multiplex. 1. A multiplex system is that one which involves the transfer of data from several comparatively slow-speed *storage devices* over a series of channels to a fast central storage device which continually is able to scan and accept data from each channel in turn. The fast storage device is able to service the channels without any part of the system getting delayed. 2. To transmit a number of messages concurrently over the same circuit.

Multiple Data Terminal. Refers to a terminal unit at which two or more *input/output* devices could be stationed and that acts as a modulator/demodulator for accepting and transferring signals between the input/output units and a data channel.

Multiplexer. *See multiplexor.*

Multiplexing. Refers to the ability for two or more signals to share the same line, but to remain independent of, and distinct from, each other.

Multiplexor. The device which is used for multiplexing, often a shared transmission line such as a bus, or a shared memory area.

Multiplexor Channel. A *channel* which allows the interleaving of many simultaneous transmissions in both directions.

Multiplexor Channel Time Sharing. A system in which a number of terminal units could be connected to the same communications *channel* so that effectively a number of independent channels exist over the same circuit. Each unit could transmit data *characters* over the circuit accompanied by identifying characters and by using the *time sharing* techniques the terminal units can all use the channel concurrently.

Multiplicand. One of the factors which is used in *multiplication*: a quantity which is multiplied by another.

Multiplication Table. In some computers the process of multiplication is carried out indirectly by looking up values in a table stored permanently within the *memory*. The table is known as the multiplication table.

Multiplication Time. The time which is required to multiply a specified pair of *operands*.

Multiplier Register. A *register* which is used to hold the *multiplier* while *multiplication* is being carried out.

Multi-Precision Arithmetic. Using more than one word for defining the numbers in a computation; the larger word size allows greater accuracy.

Multi-Processing. Multiple processors being used in one system for separate functions. The functions may be unique or overlapping, depending upon the arrangement.

Multiprocessor Interleaving. Refers to a technique for allocating *memory* areas to the different processors within a *multiprocessor system*.

Multiprocessor System. Refers to two or more *processors* which are capable of driving the same *applications* and providing extra processing power and/or *resilience* in the total system.

Multi-Read Feeding. A system which is used for reading cards on a *punched card tabulator*, in which the card has passed a *sensing station*, and consecutive machine cycles occur to enable different data to be read on each occasion, *e.g.*, name, street, town, etc., each held in a different *field*.

Multistation. Relating to any communications *network* in which several data terminals are involving.

Multi-Tasking. Refers to a mode of computer operation in which the concurrent execution of two or more programs takes place under one operating system Routines, memory space and disk files that are held in common (accessible to all) may be employed. The operations will appear to be simultaneous, but will be truly simultaneous only in a multi processor system.

Multi-User System. Refers to a system in which computers, terminals, and other peripherals get shared in any one of several arrangements.

Multivibrator. A type of oscillator used to generate non-sinusoidal waveforms.

Multi-Viewpoints. A display that is able to simultaneously generate two or more viewing screens that are adjacent but independent, *See split screen.*

MUX Abbreviation of multiplexor.

Mylar. A trade name used for polyster film generally coated with magnetizable particles It is used as a magnetic storage medium

N

NAK. Acronym for *Negative Acknowledgement.*

Name. A term which is used by a *programmer* for *identifying* any item such as a specific *instruction, data element,* resource, device, or function.

NAND. A Boolean operative whose definition is that the output is 1 (true) only if both inputs are 0 (false). The opposite of AND.

Nanosecond One billionth of a second (10^{-9}).

Narrative. Refers to the statements which are included in the *coding* of a *program* to serve as explanatory documentation of the coded procedures. Such statements do not get translated into program *instructions,* but serve as useful aids during the *debugging* or amending of a program.

Native Compiler. A compiler that produces code usable only for a particular processor or brand of equipment.

Native Language. A computer *language* specifically designed or implemented for a class of computer or *operating system.* This means that the language system is correctly integrated with the range of *software* available within the computer *system.*

N-Channel MOS (NMOS). The metal oxide semiconductor technology for large scale integration (LSI) devices developed after PMOS. It has a higher speed but lower density than PMOS.

NE. A notation for NOT EQUAL TO (acronym, pronounce letters individually). The other symbols of inequality are ≠, < (less than), or > (greater than).

NEC. Nippon Electric Co. Information Systems Inc. (acronym, pronounce letters individually). Manufacturers of computer systems and printers.

Needle Printer. Refers to a printing device in which characters get formed by activating pins to strike paper and on to ribbon. A print head having a matrix of pins is allawed to pass along the paper and appropriate pins get energized to strike the paper as required in each print position.

Negation. An operation which is carried out upon a single *operand* in which the result produced is having reverse significance in each *digit position*;

e.g., a *bit pattern p*: 010110
would appear as *r*: 101001

Negative Acknowledgement. Refers to an indication in a *network* that a *message* is incorrectly received and must be retransmitted.

Negative BCD. Refers to a number stored in *binary coded decimal* form but having a negative sign.

Negative Indication. Refers to the practice of specifying negative *fields* on a *punched card*, *e.g.*, by an *overpunching* in the most significant *card column* of the *field.*

Negative True Logic. Refers to a system of logic where a high voltage represents the bit value 0 and a low voltage represents the bit value 1. This is the reverse of traditional logic representation.

Negator. A *logic element* which is having one *binary* input signal and which provides a single binary output signal of reverse significance. It means that if a 1 *bit* is used as input, a zero bit is produced as output, and vice versa.

Nesting. Refers to a programming technique that involves hierarchical levels of instructions, usually in subroutines, that are called in a specific order. It may be thought of as instruction loops within other instruction loops. *See loop.*

Nesting Loops. A programming technique in which a *loop* of *instructions* has another loop, which may in turn has another, and so on.

Nesting Store. A *store* having several *locations* only one of which may be able to receive data from or transmit data to the associated equipment. Thus data entering the store gets pushed down from location to location as though moving through several levels.

Nesting Subroutines. A series of *subroutines* which are arranged at different levels, *i.e.*, one written within another.

Network. Refers to a series of interconnected computers, peripherals, and/or terminals which are communicating with each other.

Network Architecture. In a communications *network*, it refers to the arrangement of *nodes* and their interconnecting communications circuits, to represent the structure of the network and the significance of nodes in network control.

Network Analog. An *analog* device which is used for studying *networks* in which electrical circuits are used for refrienting the physical phenomena under study.

Network Bus. A popular local area network (LAN) configuration that uses a long length of cable (often coaxial) running near each station. Each station may exist on individual short branch segments which are connected to the common cable. A node, or controller, is able to connect the station to the cable monitor the network traffic, and pull off the communications addressed to the node. The signal passes in front of each station, and can run in two directions. One advantage to a bus network is that if one access node stops working it usually does not bring down the entire system. It also is relatively easy to add stations to the network. Ethernet^{TM} is a bus network.

Network, Data Communication. Refers to a service for distribution of information to subscribers, often throughout the country. Data from local sources has been comperessed into "packets" and sent in a continuous stream from point to point. At the destination, the data has been routed over local lines to receiving terminals.

Network Diagram. Any diagram depicting the overall structure of a *network*, the key *nodes* or stations, and the possible paths between them. It could thus represent a communications *network*.

Network Interface Unit. A device which is able to carry out a function similar to that of a *modem*; *i.e.*, it connects a data *terminal* to a circuit, forming part of a communications *network*.

Network Level. In the ISO *seven layer reference model* for *communications protocols* the third level is the network level, defining, the *packet switching service* standards to be adopted.

Network, Local Area (LAN). A system which allows several concentrations of computers and terminals within a local area to share resources like peripherals, software, or data. This encourages low-cost computer-based work stations throughout an office or campus, all of which are having access to expensive peripherals like hard disk drives, printers, or data bases without the cost of equipment duplication. In addition, enhanced communication between work stations avoids repetition of work.. Various configurations of networks are available, as well as gateways which are capable of connecting several networks to each other.

Network, Local Area, General Purpose. Refers to a local area network system that links a large community of different terminals, peripherals, and computers, and which supports a wide range of data transmission speeds.

Network, Local Area, Single Purpose. A local area network system which is devoted to one application; the network interconnects computers and work stations of one manufacturer.

Network Ring. Refers to a local area network arrangement in which signals pass through the nodes, instead of in front of them, as in a bus network. The stations form a ring, generally using coaxial cable Each station connects to the cable through a controller which examines the message on the network. If the message is for the station, the controller holds it for processing; if the message is for another station, the controller retransmits the message to the next station. Failure of one node can be able to jeopardize the whole ring.

Network, Star. A local area network in which individual stations branch from a central control node. Messages from one station to another have been first routed to a central controller. The advantage is that Private Automatic Branch Exchanges (PABX's) have been organized as star networks, which makes some companies to utilize their existing PABX wiring. However, if the central control node fails, the entire system closes down.

Network Topology. Refers to, the arrangement of *nodes* in a *communication network*. *Seenetwork architecture.*

Network User Identifier. An identification code which is assigned to a user of a communications service; the code by which that user has been identified within the system and from which *routing* procedures are able to identify the phycical location of a subscriber or his *terminal.*

Nexus. Refers to a point in a system at which interconnexions take place.

Nibble. Some computers are able to process units of data which comprises four *bits*; *i.e.*, two such units constitute an 8-bit *byte.* A 4-bit unit is called a nibble.

Nickel Delay Line. An *acoustic delay line* in which nickel finds use to recirculate sonic signals.

Nine-Edge Leading. Refers to the manner in which cards were kept in the feed *hopper* of some *punched card* machines. The cards were fed broad side so that the*row* of 9 digits was read first then the row of 8-digits and so on through to the *X-position.*

Nines Complement. Refers to a method which is used in some computers and *accounting machines* to represent negative values. The number itself has been represented by the result obtained when subtracting each digit from a digit one less than the *radix.* An example is that the five-digit decimal number —18,764 would be represented as 81235

i.e., 99999
—18764
81235

Ninety-Column Card. A *punched card* having 90 columnar positions in any of which holes may be punched to represent a character.

NMC. Abbreviation of network management centre.

NMOS. N-channel Metal Oxide Semiconductor (acronym, pronounce first letter individually, rest as one word).

Node. A junction point of a diagram, or the control points in a network.

Noise. In a circuit, a random signal or other disturbance that may interfere with the flow of meaningful signals or information.

Noise Digit. A digit, usually zero which is generated during the *normalizing* of a *floating point number*, and inserted during a *left shift* operation into the fixed *fixed point part.*

Noisy Mode Refers to the method of operation which is adopted when *normalizing* a *floating point number*, in which digits, other than zero, have been generated as part of the *fixed point part.*

Non-Destructive Cursor. Refer to a *cursor* which could be moved around a screen to point at required locations or characters, without corrupting or affecting the information currently displayed.

Non-Destructive Read. Reading information form a *location* or *register* in *memory* in such a way that the data gets retained undamaged in the source *location.*

Non-Erasable Store. Refers to any medium *store* of which the contents cannot be erased during processing, *e.g., ROM, paper tape*, a photographic store.

Non-Print Character. A control character that can invoke a special function, but which has no printed symbol. Depending upon the software, the symbol may or may not be visible on the screen during editing. *See contol character.*

Non-Reproducing Codes. In relation to *paper tape*, special codes have been punched into the tape to cause a *hardware* unit to undertake specific functions if the tape was read. The codes were not punched into any resultant output tape.

Non-Resident Routine. Any *routine* which is not residing permanently in *memory.*

Non-Return to Zero. A method which is used for encoding and interpreting a serial *binary* data signal, in which a low level signal has been treated as 0, and a high level signal as 1. There is no automatic return to a zero level after each binary digit, thus, for example, the signal will be held at a high level for any consecutive series of 1 digits. The individual degits have been identified by clock signals which signify the instants at which the signal must be interpreted.

Non-Return to Zero Inverted. A method which is used for the encoding and interpretation of serial binary data signals, in which a 1 digit has been represented by a signal level change, either *high-going* or *low-going*, and a 0 digit has been represented by a continuation of a previous signal level. Thus any consecutive series of 1 digits would be represented as a series of changes in signal level.

Non-Volatile Memory. Memory that is able to retain its contents when power is shut off.

Non-Von Neumann Architecture. Any computer *architecture* which gets departed rapidly from the *von Neumann* model.

NOR. A Boolean operative whose definition is that the output is 1 (true) only when neither of the inputs are 1 (true).

Nor Circuit. A digital circuit which is able to produce an output signal only if two corresponding input signals are absent.

Nor Element. A *logic element* operating with *binary digits*. It provides an output signal in accordance to the following rules applied to two input signals :

Input		*Output*
1	0	0
1	1	0
0	1	0
0	0	1

Hence a 1 digit is obtained as an output only if neither of the two input signals is 1. It is also known as nor gate.

Normal Stage Punching. Refers to a *punched card* system in which *interstage punching* was used, and describing the data punched as holes in the usual *punching positions* of a card.

Nor Operation. A *logical operation* applicable to two *operands* which will produce a result depending on the *bit pattern* of the operands in accordance to the following rules :

Operands		*Results*
p	*q*	*r*
1	0	0
0	1	0
1	1	0
0	0	1

For example, operating on the following 6-bit operands :

p=110110
q=011010

r=000001

NOT. The logical negation operator. It changes every 1 to 0 and every 0 to 1 in a collection of binary data. *See Boolean Algebra.*

Not. A *logical operator* having the property that if a condition p is true, then the not of p is false and if p is false then the not of p is true.

Null. Refers to an absence of information which is used as a positive confirmation of no information, as opposed to a 0 or a blank.

Null Cycle. Refers to the time required to cycle through the entire program without introducing new data.

Null Instruction. Refers to a program instruction that has no functional significance during program execution, but which may satisfy a structural requirement like breaking a program into segments or reserving memory space for an instruction to be inserted later.

Number Crunching. Repetitive or complex arithmetic calculation, as opposed to moving data in the computer system.

Number Generator. Refers to a device which could be set by a computer operator to cause a *parameter* or *constant* to be entered into a predetermined *memory location.* This sort of device 13 superseded by *console typewrieters* and other keyboard *inpur units.*

Number System, Base. Number systems vary principally by their base. The choice of the base can be advantageous for a particular application. The base has been indicated in subscript notation. For example, 10001_2, $6F_{16}$, 850_{10}. The chart given below illustrates a few number systems used in association with computers. *See base.*

Hexadecimal	Decimal	Octal	Binary
0	0	0	0000
1	1	1	0001
2	2	2	0010
3	3	3	0011
4	4	4	0100
5	5	5	0101
6	6	6	0110
7	7	7	0111
8	8	10	1000
9	9	11	1001
A	10	12	1010
B	11	13	1011
C	12	14	1100
D	13	15	1101
E	14	16	1110
F	15	17	1111
10	16	20	10000

Number Systems

Numeral. One of set of digits which may be used in a particular system of *number representation.*

Numerical Analysis. Refers to use of computing systems to solve mathematical problems; for example, equations and matrix manipulation in contrast to record keeping.

Numerical Tape. A tape having punched holes to represent numbers. It is usually made of paper, or sometimes of plastic, and used to input instructions to a numerically controlled (N/C) machine (*e.g.*, to control an automatic milling and drilling machine). These tapes are generated automatically by using a computer *program*

Numerical Character. Any character which finds use as a digit in the representation of numbers; *e.g.*, in decimal notation one of the characters 0-9.

Numeric Coding. Any system of coding which uses numerals only.

Numeric Control. Refers to the control of machinery, particularly machine tools, by using numerical instructions. Computers find use extensively in this field to provide programming *languages* for automatically generating numberical lists. These lists have been *compiled* from simple *source language statements* written by planning and production engineering staff. It is also known as numerical control.

Numric Data. Any *field* of characters which has numeric digits only.

Numeric Keypad. Refers to a set of auxiliary keys at the right of the standard alphanumeric keyboard, that is having numbers for use in efficient input of numeric data. It is a convenient auxiliary to the alphanumeric keyboard.

Numeric Processor Chip. A processor which is specifically designed to handle high precision arithmetic and scientific function evaluation.

Numeric Punching. On a *punched card*, data represented by the punching of single holes in each *column* of a *field*. *Alphabetic* characters and other symbols could be punched, for example as two holes per column.

O

Object Computer. A computer on which an *object program* has been designed to be run, as opposed to the computer which has been used to *compile* the program.

Object Configuration. The system *configuration* which is necessary for running an *object program.* It may be applied on a different configuration.

Object Language. Means the *language* or set of coded *instructions* into which a *source language* has been translated by means of a *compiler.*

Object Program. Once a program has been translated to machine language by a compilier, interpreter, or assembler, the resultant machine language instructions are referred to of the object program.

OCR. Optical Character Recognition (acronym, pronounce letters individually).

Octal Digit. Refers to a *digit* in the *octal notation* system, *i.e.*, one of the digits 0, 1, 2, 3, 4, 5, 6, 7.

Octal Notation. The *number system* which is using 8 as a base or *radix.* The octal system employs the digits, 0, 1, 2, 3, 4, 5, 6, 7, and each digit position represents a power of eight, thus the octal number 107 represents $1.8^2+0.8^1+7.8^0=71$ in decimal. Octal notation has been sometimes used as a shorthand way of representing a *stiring* of *bits.*

Odd-Even Check. Refers to a form of *parity check* in which an extra *bit* has been to a *word* or *character*; this bit is having the value 1 or 0 depending on whether the number of 1 bits in the word or character is odd or even. The value of the parity bit is recalculated whenever the data has been transferred, and compared with the value of the original bit as a check on the accuracy of the transfer.

Odd Parity Check. Refers to a *parity check* in which the number of ones (or zero) in a group of *binary digits* has been expected to be odd.

OEM. Original Equipment Manufacture (acronym, pronounce letters individually). A company that packages different components, or components and software, for the purpose of selling to a consumer for a specific function. *See turnkey.*

Off-Line. When the operation of equipment or devices is not under the control of the central processing unit.

Off-Line Equipment. Devices used in conjuntion with a computer system but are at no time connected to the *central processor.*

Off-Line Processing. Carrying out some part of a data processing system on equipment which is not directly connected to the *central processor*, and thus not under *program* control.

Off Line Storage. A *storage device* which is not under the direct control of a *central processor.* A *reel* of *magnetic tape* not *on-line* but kept in a *library* may be regarded an example of off-line storage.

Off Punch. Means punching a *punched card* in such a way that the holes do not get aligned with the *punching positions.* This implies that when the card is subsequently *read* the reading mechanism may not be able to sense the presence of the holes.

One Address Instruction. An *instruction format* making use of one *address part* which involves one *locatian* of *store* only.

One Chip Computer. Describes the case where all the elements of a computer—RAM, ROM, CPU and input/output interfaces—have been implemented on a single chip.

One-for-One. Refers to a form of *compiler* in which one *machine code instruction* has been generated for each *source instruction.*

One Level Store. A concept in a *virtual machine environment* for describing a storage system which appears to the user as a single directly accessible *store* while in fact is made up of a number of different *hardware* devices, *e.g., memory disk.*

One Level Subroutine. A *subroutine* complete in itself, *i.e.*, does not need any other subroutines during its operation.

One Output Signal. The form of signal which is produced by a unit of *store* in a *one condition* when a *read pulse* is applied to it.

One-Plus-One Address. The term used for describing an *address format* in which each *instruction* includes one *operation* and two addresses, one showing the *location* having the data to be operated on and the other showing the location having the next instruction.

Ones Complement. Refers to the *radix minus one complement* applied to *binary notation.*

One to One Assembler. An *assembly program* which is able to translate each *source language statement* on to a single *machine language instruction.* It is also known as one to one translator.

On-Line The situation in which the operation of the system and its peripheral equipment is under control of the central processing unit (CPU).

On-Line Central File. The term used for a *file* of data present on a *storage device* which is *on-line*, and can be used in *real time* or *direct access* applications as a continually available data source.

On-Line Data Reduction. Refers to the processing of information as soon as it gets transmitted from source to a computer system.

On-Line Equipment. Those devices which are forming part of a computer system and which may be kept under the direct control of a *central processor*.

On-Line Processing. *Data processing* in which all operations are carried out by equipment which is directly under the control of a central *processor*.

On-Line Programming. Refers to a method of *programming* by which the programmer inputs program *statements* directly to the computer by means of a *terminals*.

On-Line Storage. A *store* which is under the direct control of *central processor*.

On-Line Typewriter. Refers to an *input/output* typewriter under the control of a *central processor* and thus under *program* control. An on-line typewriter may be used as a form of *peripheral unit*, as an *interrogative typewriter* or as a *console typewriter*.

On-the-fly Printer. Refers to a type of high-speed *line printer* in which all the characters in the *character set* have been engraved on the surface of a rapidly rotating *print barrel*, and get printed by means of hammers which strike the paper as the appropriate character position on the barrel is in position relative to the paper. It is also known as hit-on-the-fly printer.

OPCODE. Operation CODE (acronym, pronounce as one word).

Open Ended. A *program* or system which is so designed that it could be extenden in scope or sophistication without alternation to those parts which are already in existence.

Opening a File. This process is carried out by manufacturer's *software* and involves basically identifying the *file* and checking the *header lable* against details supplied in the user's *program* to ensure that the file might be used for the purpose which is defined by the program.

Open Loop. Means a control system in which corrective action is not automatic, but it depends on external invention because of displayed information.

Open Routine. A *routine* which is inserted into a larger routine without the *calling sequence* and *link* associated with a *subroutine*.

Open Subroutine. A *subroutine* reinserted into the main sequence of *instructions* each time it is needed, rather than merely requiring a *link* to a sequence of instructions which are held in a separate part of the *programe*.

Open System. A *network* which permits computer equipment from different manufacturers to communicate with each other.

Operand. An item, quantity, or memory location upon which a mathematical or logical operation is performed.

Operating Delays. Refers to the time lost as a direct result of mistakes or inefficiency in operating a *data processing* installation, as contrasted with delays due to other causes like *repair time*, *machine-spoilt work time*, *fault*, *program* errors, data errors.

Operating Instructions. Mean step-by-step description of the activities to be carried out by an *operator* in running a particular *program* or *suite* of programs. They are provided by a programmer or systems analyst as part of the program *documentation*.

Operating Ratio. Refers to a measure of the time that a particular system (usually a combination of *hardware* and *software*) is able to provide a service. The measure is taken to be a percentage of the time available, excluding *down time*, to the total time that the machine has been switched on.

Operating Station. Refers to a *console* or set of consoles which finds use by an *operator* to control all or part of a data processing system.

Operating System (OS). The control system under which all other software functions. Software that runs the system and performs functions necessary to control system operations. Input/output, debugging, storage assignment tasks, compiling, and reporting system status are some operating system tasks. Operating systems usually are delivered by the vendor with the hardware.

Operation. (1) The action specified by one computer instruction; (2) Performing arithmetic, logical, or manipulative actions upon data.

Operation Code. The command component of a computer instruction, specifying the actual operation to be performed; for example, ADD (add), MUL (multiply), etc. Components that are not operation codes will typically be operands and may specify registers, addresses, data, etc.

Operation Decoder. Refers to a circuit which is able to interpret the *operation* part of an *instruction* and switch to the circuts needed for its execution.

Operation Part. The part of an *instruction* having the specification of the particular *operation* to be under taked. The *operation code* will be kept in the operation part of the instruction.

Operation Register A *register* in which the *operation code* has been stored during the *operation cycle*.

Operation Time. The time needed to complete the *operation cycle* for a particular *operation.*

Operator. (1) A logical or mathematical symbol or character that represents a process to be performed on an operand such as "+," "−,", AND, OR, etc.; (2) A person or machine (such as a robot) that operates a machine.

Operator Command. Refers to a *message* input to an *operating system* by an *operator* at his own instigation as compared to a message input in response to a message generated by the operating system itself.

Operator Name. In an *operating system*, it refers to the name used by an *operator* so as to identify himself to the operating system through an *operating station*, thus making him to input *operator's control language* commands and receive *prompts.*

Operator Part. Refers to the part of an *insrtuction* in which the *operator* has been specified.

Operators. Characters which designate different operations, e.g., +, −, ×, etc.

Operator's Console. A *cansole* which is used by the computer *operator* so as to control the operation of the *programs* and *peripheral units*, and to get information about their functioning. The console may include a panel of switches and warning lights, and/or a *console typewriter.*

Operator's Control Language. *Control language* commands which are designed for use by an *operator.*

Optical Bar-Code Reader. A device which is read by optical means information which has been coded *using bar codes.*

Optical Character Reader. A device using *optical character recognition* to read information into a computer system; a character reader which is able to read characters by analysis of their configuration.

Optical Character Recognition (OCR). A process by which photosensitive devices are able to identify printed graphic charactors. As the machine recognizes the characters, equivalent codes are automatically entered into the computer's memory for storage and later recall. It is also called automatic document entry (ADE). *See character recognition.*

Optical Disk. A disk which uses *optical storage* technology.

Optical Scanner. A device analysing the light patterns made by printed characters and converting the pattern into a signal which can be processed by a computer.

Optical Storage. Refers to the use of a *laser* for recording digital data as microscopic 'pits' on concentric tracks. The data has been read by photoelectric sensors which do not make active contact with the storage medium.

Optical Type Fount. A special fount which has been designed for use with *optical character recognition* devices which is also easily read by people.

Optimization. Refers to the design or modification of a system or *program* so as to make it achieve maximum efficiency.

Optional Stop Instruction. Means *instruction* which will halt the *program* when certain conditions are satisfied.

OR. A Boolean operative whose definition is that the output is (1) (true) only if at least one of the inputs is 1 (true). This is used to logically compare two or more values.

Order Code Processor. Refers to the part of a large computer system whose function is to select *low level language instructions* from *main store*, carry them out and return the results to main store. In addition the order code processor may be able to initiate *input* and *output* instructions and respond to *interrupts.*

Ordered serial File. A *serial file* whose *records* are having a *key* and which are *sorted* on that key so that the *physical* and *logical* sequences remain the same.

Ordering. Refers to the process of arranging groups of characters by sorting and sequencing them in some arbitrary manner; for example, ascending or descending.

OR Element. A logic element which operates with *binary* digits. It is providing an output signal in accordance to the following rules applied to two input signals.

Input		Output
1	0	1
1	1	1
0	1	1
0	0	0

Hence a 1 digit is provided as an output if any one (or more) of the input signals are 1. It is also known as one gate, one element, or circuit, or gate. *Boolean algebra.*

Organization and Methods. Refer to the activities, often known as O & M, which are involved in a specialist view of the organization, management, methods of control and general procedures of any undertaking.

OR Gate. Synonymous with *or element.*

Origin. Refers to the *absolute address* of the start of any area of *store* to which reference has been made when *indirect addressing* techniques have been used to locate items in the storage area. The term is also applicable to the absolute address of the beginning of the *program* area in store.

OROM. Acronym for *Optical Read Only Memory.*

OSI. Abbreviation of open system interconnexion.

Out of Line Coding. Refers to the part of the *instructions* of a *routine* which is stored in another part of the *program storage.*

Out of Service Time. Refers to time during which a computer cannot be used for running *programs* for any reason. This may be because of the development of a fault in the machine or because the machine is undergoing *routine maintenance*, etc.

Out-Plant System. Means a *data processing* system using remote *data transmission* terminals for transmission of information to a central computer.

Output. 1. Results which are produced by a computer. 2. The term applied to transfer information from a *central processor* to an *output device.* Computer output may take many different forms, such as *printout, magnetic disk, punched paper tape, visual display.*

Output Area. A part of *store* from which data could be transferred to an *output device.* It is also known as output block, output section.

Output Bus Drive. A device which is used for amplifying output signals.

Output Devices. All the data and *programs* within a computer have been stored as electrical impulses in a coded form in accordance to the *machine code* system of the particular computer. If data is held in this form it cannot be readily understood by human beings and therefore output units are used to transcribe this data into information which can be used by human beings as and when they need it. There are various types of unit which have been designed to present information in a particular manner or to deliver it at appropriate speed. For the most part output units are able to deliver information in *character* form to be examined visually by the user, but sometimes output data is needed for subsequent entry to another data processing machine and is therefore output in some other coded medium (*e.g.*, on *paper tape* or *magnetic tape*).

The commonest types of output unit include *line printers* which are generally electro-mechanical devices which print complete lines of print, up to 160 characters in width, at speeds from about 300 to 2000 lines per minute. There are also *page printers* which operate by using *xerographic* printing techniques or the result of *electron beam recording*.

Output Program. A *program* which is written specifically for the transcription of data to an *output device*.

Output Punch. 1. An *output device* transcribing information on to *paper tape*. 2. An output device transcribing information on to *punched cards*.

Output Record. 1. Refers to a *record* written to an *output device*. ?. The current record which is stored in the *output area* before being *output*.

Output Routine. A *routine* which undertakes all the processing associated with the transcription of data to an *output device*. This processing may be including the placing of the information in the *output area*, *editing*, converting information from internal format to external format and providing control information to the output device.

Output Routine Generator. A *generator* producing an *output routine* to given specifications.

Overflow. Refers to a condition caused by an arithmetic operation that generates a number which is too big for either the hardware or software word size limitations of the machine.

Overflow Bucket. A *bucket* which is used to accommodate *overflow records* in a *direct access file*.

Overlay. Refers to a technique for bringing routines into main memory from some other form of storage during processing so that several routines will occupy the same storage locations at different times. Overlay has been used when the total storage requirement for instructions exceeds the available main storage.

Overprint. Refers to print over a previously printed characters or characters so as to emphasize or improve the type. Also overstrike.

Overpunch. Refers to a hole punched in a *zone* position of a *punched card* used for *designation* purposes, *e.g.*, to indicate whether a *field* was positive or negative.

Own Coding. Means the addition of user-written *coding* to a standard *software routine* so as to extend its capabilities to cover special conditions.

Owner. A *user*, or *process* which is having overriding control over *resources* or *data*.

P

PABX. Private Automatic Branch eXchange (acronym, pronounce letters individually).

Pack. 1. Means a collection of *punched cards* which is having something in common, *e g*., a data- pack or a *program* pack. Also known as deck. 2. To place more than one item of information into a single unit of *store* so as to conserve storage space.

Package. A generalized *program* which is written for a major application in such a way that a user's particular problems of data or organization will not make the package any less useful.

Packet. A short, fixed-length block of data which is used for transmission. Each packet has bits for control information, such as address, routing, security, error control, etc., as well as data. *See packet switching network*.

Packet Switching Network. A network of devices that are able to communicate by means of packets of information. Each device needs software to identify which packets to keep and which to send on.

Packet Switching Service. Refers to a method by which the data handling capacity of a *network* could be measured, allowing the same circuits to handle data destined for many different users by subdividing information into a series of units, called *packets*, each of which conforms to a *protocol*.

Packing Density. Refers to the number of units of information contained within a given linear dimension. For example, one type of tape drive is having a packing density of 1600 bits per inch (bpi).

PAD. Acronym for *Packet Assembly and Disassembly.* Refers to a software *routine* within a *packet switching network*, which is dealing with the process of forming *messages* into packets and reconstituting messages from packets.

Pad. Refers to a device for creating input by means of writing on a flat surface with a special pen. Data input may be text or graphics.

Padding Refers to the adding of blanks or non-significant characters to the end of a *record* or *block* so as to make it up to some fixed size. This technique is used if *fixed length records* or *fixed blacks* are being used, to enable units which do not have enough significant data to be processed.

Paddle. A cursor control device which is used for computer games.

Page. (1) A logical fixed-length block of data or a program subdivision treated as an entity in storage. It can be shuffled back and forth from main memory to secondary memory in order to optimize main memory space; (2) A segment of memory organized for a particular purpose; (3) To call into memory, or send to secondary storage, a page of data; (4) A screenful of information on a CRT screen. *See scrolling.*

Page Printer. Means a *printer* for which the character pattern for a complete page has been determined before printing.

Page Turning. Refers to the process by which the *pages* displayed on a *video* could be successively replaced.

Paging. The method in *virtual storage* whereby *physical storage* has been allocated to the *pages* which make up a set of data.

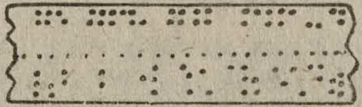
Pan. Means a technique in image processing whereby an image appears to move across the screen. This technique is widely used to display detail from an image too large to display on a screen in its entirety.

Paper Advance Mechanism. That part of a *printer* which is able to move paper past the printing positions. The mechanism may be under computer control, thereby enabling the number of lines advanced to be determined by *program.*

Paper Feed. Refers to the method by which paper is pulled through a printer.

Paper Low Condition. A warning condition which indicates that the supply of *continuous stationery* on a *printer* has been about to run out.

Paper Tape. An old but reliable storage medium by which data are stored as punched hole sequences on a paper tape. The technique has been found to be slow but inexpensive.



Paper tape

Paper Tape Code. A *code* which consists of a pattern of holes punched across a strip of *paper tape.* Codes were ascertained by the number of *tracks* on the paper tape, the most usual being 5 track, 7-track and 8-track codes.

Paper Tape Punching. Refers to the punching of holes into *paper tape* whereby the pattern of holes formed a *code* for recording information.

Paper Tape Reader. A device which is able to translate the information punched in code on *paper tape* into *machine language* and then transmit the data into a *central processor.*

Paper Tape Reproducer. A device which could automatically produce a copy of a punched *paper tape.* It is also know as a reperforator.

Paper Tape Verifier. A machine which was once used for checking that the holes punched in *paper tape* represented the data on the original documents.

Paper Throw. Refers to the movement of paper through a *printer,* other than the advance of paper for printing, at a speed greater than that of single line spacing.

Parallax. Refers to the apparent distortion of an image viewed, for example, through the glass front of a *video screen.* Parallax errors take place when as attempt is made to touch a point on the display with a *light pen* or when a *touch sensitive screen* is used.

Parallel. Dealing with all the elements of an item of information simultaneously.

Parallel Allocation. Refers to a method of allocating *controlled files* in such a manner that each file has been allocated the same *tracks* in each *cylinder* of the *controlling file.*

Parallel Attribute. Refers to a *videotex* and *teletext* standard, whereby an attribute defining the characteristics of a particular character cell has been encoded as part of the character code and does not occupy a separate cell.

Parallel Interface. Refers to an *interface* in which parallel transfer of data takes place between *peripheral units* and *processor.*

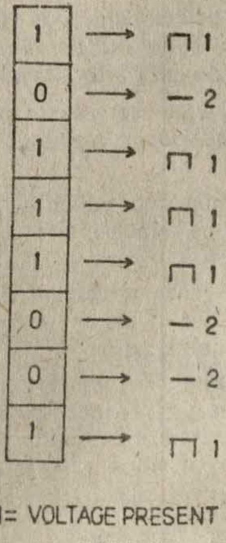
Parallel Processing. A computer operation during which two programs run concurrently, using more than one central processing unit.

Parallel Running. Refers to a method of testing new procedures by operating both the new system and the one it has been designed to replace together for a period of time; the results produced by the new system could be compared for accuracy with those which are produced by the old.

Parallel Storage. Storage in which all elements of a word are handled at the same time.

Parallel Transmission. Refers to the transfer of data so that all bits get transmitted simultaneously, each one over a separate path. Parallel transmission needs more equipment than serial transmission, but is faster (See Figure on p. 184).

Parameter. (1) A variable whose value is set in the main program and passed along to a subroutine, and vice versa; (2) A definable characteristic, or one of a set, whose value determines the values and limitations of a system.



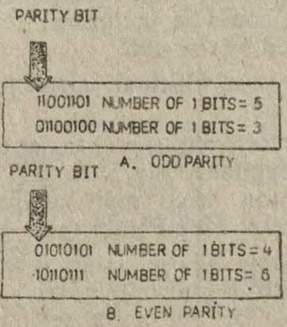
Parallel Transmission

Parameter Card. Means a *punched card* on which the value of a *parameter* needed by a *program* was punched and subsequently read. It is also known as *control card.*

Parameter Word. A *word* of *store* in which the *parameter* for a *routine* is kept.

Parity Bit. A check *bit* whose value (0 or 1) has been found to depend on whether the sum of 1 bits in the word being checked is odd or even.

Parity Check. An error detection technique which is used for checking the accuracy of computer words after transmission. One extra parity bit has been included with each character (byte). In an "even" parity convention, the parity bit is set


PARITY BIT
11001101 NUMBER OF 1 BITS= 5
01100100 NUMBER OF 1 BITS= 3
A. ODD PARITY
PARITY BIT
01010101 NUMBER OF 1 BITS= 4
10110111 NUMBER OF 1 BITS= 6
B. EVEN PARITY

to 0 only if the sum of digits in the original words is an even number. The reverse holds in an "odd" convention. If a single bit changes state because a hardware malfunction has occurred, the parity check will detect an inconsistency.

Parity Error. An *error* which is caused by incorrect parity detected because of a *parity check.*

Partial Carry. A technique which is used in *parallel* addition in which a *carry* is temporarily stored instead of being added in immediately.

Partial RAM. A RAM in which some bits do not function. In some of the newer 64K chips as many as half of the bit locations turn out to be unusable.

Pascal. A high level programming language which is known for features that promote structured programming, block structure and data types. It was invented by Niklaus Wirth, but named for the seventeeth century French mathematician and philosopher, Blaise Pascal. *See structured programming.*

Pass. 1. Refers to the passage of *magnetic tape* past the *read heads.* 2. Also refers to a single execution of a *loop.*

Password. Refers to a group of *characters* which on input to a computer from a *terminal* give the *user* access to information and permits the user defined control over the information.

Patch. Refers to a section of code which is used to correct or alter a program. It is inserted into a program in an ad hoc manner after the program has been completed. It will not be directly inserted into the program until the program is rewritten.

Patchcord. A connector having a flexible part which is used to connect the sockets of a *plugboard.* In *punched card* usage it is synonymous with *plug.*

Path 1. Refers to the logical sequence of *instructions* in a computer *program.* 2. Refers to the complete set of stages through which a message packet is passing during its transmission between two points. Paths may be linked by *switches* to form a *switched circuit.*

Pattern Recognition. Refers to the recognition and identification by a computer of shapes, forms, signals, sequences, and configurations.

Pattern-Sensitive Fault. A *fault* which is caused by the recognition of some specified pattern of data.

PC. Printed Circuit (acronym, pronounce letters individually).

PC. Personal Computer (acronym, pronounce letters individually).

PCI/O. Program Controlled Input/Output (acronym, pronounce letters individually).

P-Code. Refers to a method of translating a source code to an intermediate code, called P-code, by using a compiler, then using a special P-code interpreter on a host machine to obtain executable object code. The advantage of this approach is portability; each host machine requires only its own P-code interpreter and not a separate compiler. The compiler module acts as a standard for all machines. The disadvantage is that the execution is slower than takes place with one-step translation to object code. Many versions of Pascal employ P-code.

Peak Load Refers to the maximum traffic which is experienced by or planned for a *network*.

Peak Volume. Refers to the number of simultaneous calls which are being handled by a *network* at its busiest period.

Pecker. Refers to the sensing device in a mechanical *paper tape reader*.

Peek. A statement in the BASIC Programming Language that is able to display the contents of a particular memory location in decimal form.

Pen. A device which is used for operating handwritten input. A light pen is used to write directly on a screen; other pen types may be used with graphics pads.

Perception Data. Refers to the information on factors which impact the way users perceive a computer system; in particular, features making system *user friendly*.

Performation Rate. The rate at which holes could be punched into *paper tape* by a *tape punch*.

Perforator. A hand-operated *tape punch* which is used for punching *paper tape*. It is also known as *keyboard* perforator.

Performance. Refers to a measure of the power of a computer system. Various performance criteria exist such as *throughput*, *access time*, and processing power in terms of mips (millions of instructions per second). Frequently a computer system has to undergo a *benchmark* as a verification of performance targets.

Performanace Degradation. (1) Any situation in which the performance of the system is not optimal; for example, when two or more programs are competing for necessary resources; (2) Hardware failure of a component.

Peripheral. A device, usually for input/output such as storage or printing, connected to a computer and under its control to some degree. Examples include, but are not limited to: printers, card readers, tape drives, disk drives terminals.

Peripheral Buffers. Refer to small elements of *store* which form part of a *peripheral units* and are used for storing data before transmission to a *central processor*, or receipt form the central processor before transcription to the *output medium*.

Peripheral Controller. Refers to that part of a system whose function is able to control data transfer to or from *peripheral units* of different types.

Peripheral Control Unit. A device acting as the link between a *peripheral unit* and a *central processor* and which interprets and acts on instructions from the processor.

Peripheral Interface Channel. A *channel* providing the connceting part for information to flow between a *peripheral unit* and a *processor*.

Peripheral Limited. A system is said to be peripheral limited if the overall processing time has been dictated by the speed of the *peripheral units* rather than the speed of the *central processor*.

Peripheral Manager Interface. Part of a *kernel* which is able to control *input* and *output* requirements.

Peripheral Processor. In a *data processing* system which makes use of more than one *processor*, a peripheral processor is a processor which aperates under the control of another processor. Normally the peripheral processor will control all *input/output* functions of the system, providing a flaw of data to and from the processor.

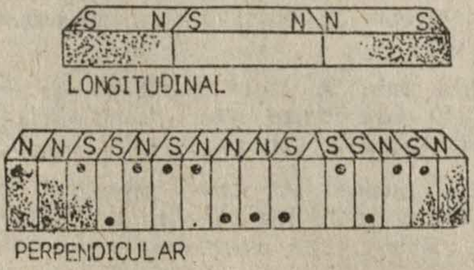
Peripheral Prompt. A message which is initiated by an *operating system* to inform the *operator* of the state of a particular *peripheral* unit, or the need to *load a file*.

Peripheral Slots. Holding slots built into the housing of some microprocessor units so that cards could be added so as to increase capabilities without hardware modification.

Peripheral Transfer. Refers to the transfer of a unit of data which is taking place between a *peripheral unit* and a *central processor* or between peripheral units.

Peripheral Units. Machines operated under computer control. Peripheral equipment includes *input devices*, *output devices* and *storage devices*. Examples of peripheral equipment are *tablet*, *floppy disk*, *magnetic disk*, *magnetic drum*, *magnetic tape*, *printer video*.

Perpendicular Recording. A recording technology that has repeaced traditional longitudinal, or end-to-end-organization of magnets along the recording track with vertically oriented magnets in order to increase potential recording capacity.



Perpendicular Record

Personal Computer. A moderately priced, general-use computer which has been designed principally for a single user in a home or small-office environment.

PERT. Program Evaluation and Review Techniques (acronym, pronounce as one word). A system from which the critical path method had been derived, and which is very similar. *See critical path method.*

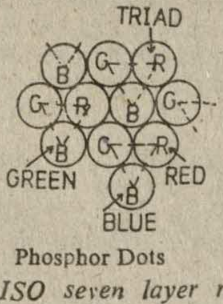
Phase Modulation. Refers to a method of representing *binary* information in which the phase of a carrier signal has been used to indicate 0 and 1.

Philoxenic. Synonymous with *user friendly*, from the Greek 'philos' (friend) and 'xenos' (stranger).

Phoneme. One member of the set of the smallest components of speech, which is able to distinguish individual utterances from each other in a language.

Phonetic System. A system that uses a data base of voice information (phonemes) to produce sounds that emulate speech.

Phosphor Dots. The minute particles of phosphor on a CRT picture tube used to create the image. On a color picture tube, combinations of red, blue and green dots are organized in a pattern of dot triads.



Phosphor Dots

Physical Level. In the *ISO seven layer reference model* for *open systems architecture*, it refers to the control level which is able to defince the physical interface between a *terminal* and the data circuit terminating equipment.

Physical Data Independence. Where a *file structure* or the *physical medium* on which a file has been held, may be altered without affecting the *application program* using the data.

Physical File. In an *operating system* it refers to a *file* present on a specific physical *storage* medium, *e.g.*, a specific *magnatic tape* or *disk*. A file in an operating system may be present on a number of different physical files.

Physical File Copy. Means a copy of a *physical file* which is of the same or different *medium.*

Physical File Report. Means a list in readable form of the contents of a *physical file.*

Physical Interface. Refers to the specification of the electrical properties of the signals which are needed to establish, maintain and clear the connexion between a *terminal* and data circuit terminating equipment.

Physical Record. Refers to a unit of information contained within a specific, addressable location on a storage medium such as a magnetic disk or tape, and which is stored all in one unit instead of scattered as in a logical record.

Physical Track. Refers to the path along which a single *read/write head* on a *disk* or *drum* moves.

PIC. Priority Intercept Controller (acronym, pronounce letters individually). A special chip which is utilized to manage several external interrupts. It decides priority in a situation of simultaneous interrupts, and in some cases interrupts servicing of devices that have low priority in favour of devices that have higher priority. *See priority interrupt.*

Picosecond. Refers to 10^{-12} or one trillionth of a second.

Picture. Refers to a set of information which has been available for *display* on a *video* or *terminal.* Because of the physical limitations of the screen on a specific device the picture may have a number of *pages.*

Picture Description Instruction. Usually referred to by the abbreviation *PDI.* A form of code which is used to describle the formation of an image by means of a combination of elements like dots, lines, polygons, arcs, etc. PDIs find use, for example, in *alphageometric videotex* coding standards.

Picture Element. In any *graphic display*, it refers to the smallest element of the image which could be individually *addressed* by the computer program. In a graphic system, the number of picture elements depends on the resolution capability of the display. It is also known as pel or pixel.

Picture Frequency Means the frequency with which the complete set of lines which make up a television picture could be displayed, measured in cycles per second (Hz). Typically, picture frequency in the USA is 30 Hz, and in Europe is 25 Hz.

Pie Chart. Refers to the graphical representation of information in the form of a 'pie', with each 'slice' exhibiting the proportion contributed to the whole of a number of constituent elements.

Piezoelectric. A property of some crystals, which undergo mechanical stress when subjected to voltages, or which produce a voltage when subjected to mechanical stress.

Pilot System. Refers to a method of testing new procedures by processing a representative sample of data from the operations which are to be covered by the new system, either by sampling historical data or taking a sample from current operations.

Pin. Refers to the small 'legs' on a *chip* which correspond to maching holes on a *printed circuit board*, by which the chip could be connected to the board.

Pinboard. A form of *plugboard* in which the interconnexions have been done by cordless *plugs* in the form of pins.

Pin-Compatible. IC devices that use the same pins for the same signals.

Pin Feed. The pin mechanism of a printer, which guides the punched holes of fanfold paper through the sprocket. Also tractor feed, sprocket feed.

Ping-Pong. A programming technique which is used for processing *multi-reel files*. It uses two *magnetic tape* units, switching between them until the whole file has been processed, the successive reels being kept on alternate units.

Pipelining. Starting the execution of one computer instruction before a previous instruction is completely executed.

PIT. Programmable Interval Timer (acronym, pronounce letters individually).

Pixel. Abbreviation for picture element. The basic rectangular element that, in combinations, produces the images on a raster-scan video screen.

Platen. Refers to the backing that a print element strikes against to make character imprints.

PLATO. A computer-based educational system consisting a large, high speed central computer that can service up to 1000 terminals in a time-share mode. It is geared to individual instruction consisting of interactive lessons with the student entering responses through the keyboard or touching answers displayed on the screen. The system is currently being implemented for use with microprocessors.

PL/M. Programming Language for Microprocessors (acronym, pronounce letters individually). Derived from PL/1 but for use on microprocessors.

PL/1. Programming Language 1 (acronym, pronounce letters individually) A high level language which was developed in the mid-60s that combines features useful for both scientific and data processing applications.

Plotter. A device for producing hard copy of graphic images by controlling pens or other drawing media. A plotter addresses points related to x and y coordinate axes in a (seemingly) random fashion, as compared to a printer that produces successive lines and columns of type. *See flat bed plotter.*

Plug. A device, usually having a flexible cord with one or more metal pins at each end. It is used to connect the sockets of a *corrector*.

Plugboard. A device which is used for controlling the operation of certain types of *data processing* machine by using a removable board with terminals which might be connected in different patterns by using plugs fitting into sockets on the board. The specific action needed for the machine was determined by the particular interconnexions made; these might be changed at any time to change the functioning of the machine. It is also known as patch panel, patchboard, control panel, problem board, jack panel.

Plug Compatible. Refers to the ability to interchange one device for another usually without modifying the hardware or the software.

Plugging Chart. A printed chart which represents the sockets on a *plugboard* It was employed for planning interconnexions of sockets which would make a machine to carry out its required function.

Plug-in Card. A *printed circuit board* which is able to carry out a discrete logical function in a computing system, and gets inserted into the *host* system by connexion through a slot.

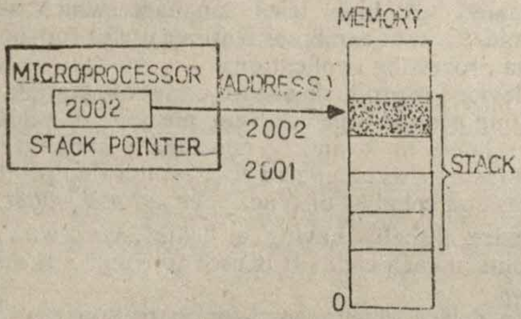
Plug-in Unit. Means a self-contained circuit assembly which is forming part of a more complex whole but which could be removed and replaced as a unit.

PMOS. P-channel Metal Oxide Semiconductor (acronym, pronounce first letter individually, rest as one word). A relatively old MOS technology for large scale integration (LSI) devices. It has been characterized by high circuitry density, but slow microprocessor speed when compared to NMOS.

Pneumatic Computer. A computer in which signals have been transmitted and information stored by means of the flow and varying of pressure in a fluid-either gas or a liquid.

Pocket Synonym for *stacker*, which is usually used in connexion with a *sorter*.

Pointer. An address which is used to locate some data at a specific location in memory This item of data has an address (points to a memory location) of another item of data.



Pointer

Point Mode Display. Refers to a method of displaying data as dots plotted on the tube surface of a *cathode ray tube visual display unit*.

Point-to-Point Connexion. A circuit which connects two (and only two) devices without any intervening device, for example, a *terminal* and a central computer, or two computers.

Point-to-Point Network. Refers to *network* in which the connexions between individual *nodes* is by using *point to-point connexions* without the necessity for any form of *switching*.

Poke. A statement which is used in BASIC programming language to place data directly into a specified memory location.

Polish Notation. Refers to an arbitrary way to state mathematical relationships in order to avoid parentheses. For example, (A+B)×(C+D) might be written as AB+CD+x, which means: get A and B, then add; get C and D, then add; then multiply. This offers advantages in hardware and software design.

Polling. Refers to a technique to identify which input/output device among several is trying to get the processor's attention so it can be serviced.

Port. Refers to an input/output connection for interfacing peripherals and computers. The port has a male or female connector with a specific number of pins; each pin carries an agreed-upon signal. A number of standards are evolved for pin connectors. One of the best known is RS-232. All of the devices using the RS-232 standard could be physically connected; however, appropriate software is needed to decode the received signal.

Portable Computer. Usually refers to the physical size of certain computers that may be conveniently hand-carried and which are having the same dimensions as a small typewriter. *Compare with hand-held, briefcase and desktop computer.*

Portability. Refers to the ability of a program to be used on more than one system. Theoretically, programs written in high level languages are portable. In reality, variations between manufacturers' systems need some degree of modification of most programs that are used on different systems. Only subsets of a language are, therefore, truly portable.

POS. Abbreviation of point of-sale.

Post. To update a *record* with information.

Posting Interpreter. Synonymous with *transfer interpreter punched card interpreter.*

Positive True Logic. A logic system where a lower voltage represents a bit value of 0 (false) and a higher voltage represents a bit value of 1 (true).

Post-Mortem Dump. A *dump* taking place after a *program* has finished, usually to provide information during *debugging.*

Post-Mortem Routine A *routine* used to give information about the functioning of a *program* after the program has been finished. *See debugging, diagaostic routine.*

Powerful. 1. Software is regarded powerful if it is efficient and provides a wide range of options. In user software, it refers to the user's ability to put these options into action without too much effort. In system software, it denotes the ability to generate complex commands with a minimum of instructions; 2. Hardware is regarded powerful if it is faster, larger, and more versatile than comparable machines.

Power Supply. The unit, usually within the computer housing, that is able to convert the alternating current (AC) line voltage from the wall outlet to the direct current (DC) needed by individual electrical componeuts.

P-Pulse. Synonymous with *commutator pulse.*

Preamable Sequence. A series of *bits* which are used to establish synchronization of messages transmitted within a *local area network.*

Precision. Refers to the "exactness" or accuracy associated with a number. For example, 5-1234 is having 5 digits of precision; if it were to have 3 digits, it would be rounded off to 5.12.

Pre-Edit. The technique of having a preliminary *editing* run on *input* data before the data has been used for further processing.

Prefix Notation. Refers to a type of notation in which a complex *expression* having several *operators* and associated *operands* is formed without the use of brackets, the scope of the operators being determined by their relative positions.

Preprocessor. A program used in emulation to convert data from one format, that of the system being emulated, into the format that will be accepted by the emulator.

Pre-Read Head. A *read head* kept in such a position near another read head that it may be used for reading *records* before they are passing under the second head.

Presentation Level. Refers to the sixth level within the *seven layer reference model* for *communications protocols*, which defines the way data has been displayed to the user.

Preset Parameter. A *parameter* whose value has been fixed before a *routine* is run.

Presort. Refers to the first *pass* of a *sort program.* The sorting of data on *off-line equipment* before processing it on a computer.

Pre-Store. Means the placing of data in a special part of *store* before entering a *routine* to process the data.

Presumptive Address. A quantity appearing in the *address part* of a *quasi instruction.* It acts as an *origin* for subsequent *address modification.*

Preventive Maintenance. *Maintenance* which is done with the intention of preventing the occurrence of faults, *i.e.*, regular maintenance as opposed to 'fire-brigade' maintenance.

PRF. Abbreviation of pulse repetition frequency.

Primitive File. In an *operating system* it refers to a set of *physical files*, possibly on different devices, which are handled as a single entity by the operating system.

Print Bar. Refers to a type of *print member.*

Print Barrel. A drum on the surface of which have been engraved all the *characters* used by an *on-the-fly printer.* The barrel has been rotated rapidly and characters have been printed by hammers which strike the paper as the appropriate character is in position relative to the paper.

Printed Circuit. Refers to the technique of etching the details of a computing *circuit diagram* on the surface of a board. It is a process allowing for the exact replication of unlimited copies of the original circuit.

Printed Circuit Board. An insulating board onto which a circuit has been etched or printed. Electrical components such as transistors, resistors, switches and diodes are then mounted on the board. Same as printed circuit card.

Printer. An output device for producing hard copy. *See dot matrix printer, letter quality printer.*

Printer, Dual Mode. A dot matrix printer that produces characters on paper at one rate for near letter-quality printing for word processing (average 100 cps) and at a faster rate (average 160 cps) for draft quality results in data processing.

Print Format. Refers to a description of the way information has to be printed on a *printer*, usually provided as part of a *program specification*.

Print Hammer. Refers to the device on certain types of *printer* which is activated so as to force paper into contact with the *character* to be printed.

Print Member. Refers to the mechanism in a *printer* which is responsible for the form of the printed character.

Printout. Hard copy which is produced by a printer.

Print Position. The position on a *printer* at which a *character* could be printed. The positions are usually numbered 1-n (where n represents the maximum number of characters which can be accommodated on a line) starting from the left-hand edge of the line.

Print Totals Only. To print totals referring to a batch of input data, as compared with *list* which involves the printing of details from each individual record in the batch.

Print Wheel. In a *wheel printer*, it is a wheel which has around its rim the type for the characters available for printing. The wheel has to be moved to bring the appropriate character into position for printing.

Printed Circuit Board. An insulating board onto which a circuit has been etched or printed. Electrical components such as transistors, resistors, switches and diodes are then mounted on the board.

Priority Indicator. In *data transmission*, it refers to a code which is used to indicate the relative importance of a message, and hence the order of transmission of the message.

Priority Interrupt. A system of interrupt in which devices of a higher priority may obtain servicing by the central processing unit (CPU) before lower priority devices.

Priority Processing. A system which is used in *multiprogramming* for determining the sequence in which different programs are processed.

Privacy. Means the concept of restricted *access* to *data* and *information* held within a computer.

Problem Definition. Refers to a method of presenting a problem for computer solution in a formal and logical manner. It is also known as problem description.

Problem Oriented Language. A *program language* which is designed for handling problems in certain broad application types related to mathematical, scientific or engineering systems, or to business systems.

Procedure. 1. Refers to the sequence of steps required to solve problem. 2. More specifically, refers to describe a section of *code* which acts as a *subroutine* with an *operating system.*

Procedure Oriented Language. A *program language* which is designed to make the expression of problem-solving procedures simple to use.

Process. 1. A general term used for any computer operation on data.

Process Image. Within an *operating system,* used for the totality formed by a particular *program* together with any system *software* utilized carry out the program.

Processor. A general term for any device which is capable of carrying out operations on data. Sometimes it is used as a synonym for *central processor.*

Processor Bound. A situation in which the limits of the speed of a computation are determined by the capabilities of the processor. *See I/O bound.*

Processor Error Interrupt. The interruption of a *program* due to the failure of a *parity check* in the transfer of information within the *central processor.*

Processor Limited. Refers to a system in which the overall processing time is dictated by the speed of the *central processor* rather than the speed of the *peripheral equipment.* It is also known as process limited. Contrasted with *peripheral limited.*

Process State. Refers to the state which a *process* has reached during the course of its *execution.*

Product. The result of multiplying two *factors,* the *multiplicand* and the *multiplier.*

Production Run. Refers to a normal operational *run* of a system.

Productive Time. Means time spent by a computer system in processing *production runs* during which no machine faults takes place.

Program. Refers to a sequence of instructions which are given to the computer to carry out specific functions or tasks. Programs are also referred to as "software." *See software, applications software.*

Program Cards. *Punched cards* having *program instructions*, either in *machine language* or *source language*, often with one card used for each instruction.

Program Chaining. Refers to a technique for allowing programs to be run that are larger than main memory by sequential loading and executing of successive modules of that program.

Program Compatibility. The term used for the situation in which two different computers an able to accept and operate on the same *program* or programs which have been written in the same *machine language* or *source language*.

Program Control. Any device operating *on-line* to a *central processor* is said to be under program control.

Program Controller. Refers to the unit in a *central processor* which is able to control the execution of the computer *instruction* and their sequence of operation. It is also known as program control unit.

Program Counter. Refers to a resister in the control unit of the CPU that has the address of the next instruction to be fetched from memory. The program counter has been automatically incremented after each instruction is fetched.

Program Development Time. Refers to the total time taken to produce a working computer *program*. This will include time spent in *compilation*, *testing* and *debugging*.

Program Flowchart. A *flowchart* using *flowchart symbols* to represent the functions carried out by a particular routine.

Program Language. A *language* which is used for writing computer *programs*.

Program Library. Refers to a collection of proven *routines* or *subroutines* which are used in a particular installation. This consists usually of *programs* developed by the user concerned and also by the computer manufacturer. The pograms may be existing in various media (*e.g.*, *floppy disk* or *cassette tape*) but are generally maintained on *magnetic tape* or *direct access file*.

Programmable Communications Interface. An interface board which is used for communications control, in which major features, such as baud rate, are programmable rather than being preset (hard wired).

Programmable Function Key. A *function key* whose function can be found out by *program*, and which may vary depending on the program being *executed.* In computer *games*, the same key could be used to initiate a number of different actions if different games are played.

Programmable Read only Memory (PROM). Similar to ROM but can be programmed once by the user. A special PROM programmer is used to write in the new program. *See EPROM.*

Program Maintenance. Refers to the keeping of *programs* up to date both by correcting errors, and by programs in accordance to changing requirements.

Programmed Check. A *check* which is carried out by means of *program instructions*. Sometimes contrasted with an *automatic check* which is carried out by *hardware*.

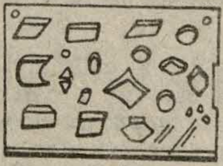
Programmed Dump. A *memory dump* taking place at specified points within a *program* because of instructions incorporated into the program

Programmed Halt. A *halt* in a *program* because of the program encountering a *halt instruction* or an *interrupt*. Also known as coded stop. Contrasted with *unexpected halt.*

Programmer. A person who is responsible for producing a working *program* from a *program specification*.

Programmer Defined Macro. A *macroinstruction* which is defined by a programmer for use in a specific *program*, in contrast with a predefined macroinstruction which may form part of the *instruction set* of a given *language*.

Programmer's Template. A pattern guide on which there are flowchart, logic and other symbols used in programming.



Programmer's Template

Programmer Unit. Refers to a device which sets the correct conditions for programming a *PROM*, and thus permits a user to program a PROM.

Programming. It may be defined as the process by which a set of *instructions* is produced for a computer to make it carry out a specified activity. The activity includes anything from the solution of a mathematic problem to the production of a company payroll. The instructions ultimately obeyed by the computer are the numerical codes which are significant to the computer's *central processor.* Since a computer is entirely dependent on instructions supplied to it by its all too human users, it cannot undertake any task adequately unless the problem it is required to solve has been specified correctly in every detail and the instructions it is asked to obey define in complete detail each step of the solution. The main steps which have to be covered before a program has been completed are : (*i*) Try to understand the problem, and plan the solution, (*ii*) Make a *flowchart* or *decision table* of the problem, (*iii*) Prepre the instructions in coded form, (*iv*) Test the program until it is carrying out correctly, (*v*) Prepare detailed documentation of the program and instructions on its operation.

Program Modification. 1. Refers to the use of *modification* in a *program by* which *arithmetical* and *logical operations* are carried out on *instructions* and *addresses* so as to change their actions during the program. 2. Refers to modify a program by re-writing it or adding a *patch* so as to after the function of the program.

Program Parameter. A *parameter* whose value has been incorporated into a *routine* by using *program instructions* after the *run* has started.

Program-Sensitive Fault. A *fault* which takes place as a result of some combination of *program instructions.*

Program Specification. Refers to a comprehensive description of procedures for which a computer *program* is needed. The program specification is used by a programmer so as to prepare a program.

Program Step. A single element of a *program* which is usually a single *instruction.*

Program Storage. The area of *store* in which a *program* is kept. On some systems it may be a specially reserved part of store, or may be specially protected to prevent accidental interference with the program.

Program Tape. Refers to a *magnetic tape* or *paper tape* on which one or more *programs,* usually in *object program* format, could be stored. If a particular program is needed for running, it is read into the *main store* from the program tape.

Program Test. A computer *run* which has been designed to discover errors in the *program* being run.

Program Testing. Checking a *program* so as to establish that it is carrying out expected operations correctly and that all errors are discovered by running the program on a computer, usually with *test data.*

Program Testing Time. Time which is spent on a computer in *program testing.* Program testing time is part of the total *program development time.*

PROM. Acronym for Programmable *Read Only Memory* (ROM). A form of ROM whose contents could be altered by the 'user' by means of a device called a *PROM programmer* or *PROM* blower. *PROMs whose contents can be erased and reprogrammed are termed as EPROMs*; *when the erasing procedure is electrical, they are known as EEPROMs* (electrically erasable PROMS); where the erasing process uses ultra-violet rays, they are known as *UVEPROMs.*

PROM Programmer. A device (not an individual) inserting code or data into a *PROM.* This activity is sometimes termed as 'blowing' a PROM, and the device is thus also termed as a PROM, blower.

Prompt. A symbol generated on an input/output terminal; its purpose is to make the user aware of the necessity of further input, or the location of an input.

Prompt Identifier. A code or number which is displayed with a *prompt* so as to identify it uniquely.

Proof Copy Mode. Refers to the ability of a printer to make a proof copy with notations, highlighting, or symbols to mark revisions.

Propagated Error. An error taking place in an operation and its influence extends to other operations.

Propagation Time. Refers to the time taken by an electrical impulse to travel from one *node* of a *network* to another.

Proportional Spacing. Refers to the ability of a printer to allocate spaces in tiny increments so as to compensate for the varying widths of the characters. Although more complex routines are needed, the output appears more pleasing than outputs in which characters have been given equal space regardless of width. This is essential to the production of completely justified copy.

Proprietary Software. Programs written by and/or controlled by an owner who has legal rights and titles. Copy and/or disclosure of program contents cannot be made by another party without prior agreement between owner and second party. It is usually protected by a copyright.

Prosthetic. Sometimes used to refer to the computer's use as a versatile tool that provides access to a large variety to inaccessible spaces and activities.

Protected Field. (1) An area on the CRT screen containing data that cannot be altered by an operator until it is freed by a special command; (2) An area of memory that cannot be altered by a user program.

Protected Location. A *location* of *store* whose contents cannot be changed without some special procedure, thereby preventing unplanned *modification* of the location.

Protected Record (or Field). A *record* or *field* which is displayed on *video.* It cannot be *overwritten* by the *operator* but could be changed only by data sent from the processor.

Protection. 1. Refers to the techniques of prevention of interference between units of *software* or areas of data within a *multiprocessing system.* 2. Refers to the technique of preventing or making difficult the unauthorized use of *software* or *data*, *e.g.*, by the use of *passwords* or sophisticated *hardware* techniques.

Protection Mechanism. Means of carrying out *protection.*

Protocal. A set of conventions governing the transfer or exchange of information between two systems or devices. For example, a CPU cannot talk to a printer until there is an agreement as to which circuits will carry signaling (operating) information and which circuits will carry data. In addition, there must be agreement as to which bit configuration will trigger a specific event, such as a printer line feed. These conventions have been defined as recognized sets of standards called protocols.

Provable System. *Software* capable of meeting the requirements of a formal mathematical proof that its semantics meet its specification.

Proving. Testing a machine so as to find out whether it is free of *faults*, usually by running a *test program.*

Proving Time. Means time spent on a machine in *proving.*

Pseudocode. A *code* in which *program instructions* have been written, making use of symbolic representations of *operation codes* and *addresses*, and needing translation into *machine code* by using a *compiler* before the program can be run.

Pseudo Instruction. An *instruction* which is composed of characters arranged in symbolic form, but not carried out as an actual instruction in the running of the *program*, but is able to control the conversion from *source language* to *object language.*

Pseudo Operation. An *operation* not performed by using *hardware.* Such an operation may be carried out by means of a *microinstruction* or by means of special *software.*

Pseudo Random Sequence. A set of numbers produced by a defined process but can nevertheless be regarded to be a set of *random numbers* for a given calculation.

PSS. Abbreviation of *packet switching service.*

PSTN. Abbreviation of *public switched telephone network.*

Public Domain Software. Software that is not copyrighted and that can be freely exchanged and copied.

Pulse. A significant and sudden change—which is of short du ation—in the intensity of an electrical variable such as voltage.

Punch Card. A standardized stiff paper card which is used for storing information via strategically punched holes. The card can be handled mechanically and machine-processed; the punched holes could be sensed electrically by metal fingers, or photo-electrically by photo cells.

Punched Card Field. A *field* of information which is present in a *punched card.*

Punched Card Interpreter. A machine which is capable of reading the holes punched in a *punched card* and making the corresponding alphabetic and numeric characters to get printed on the same card or (on a *posting interpreter* or *transfer interpreter*) on the following card.

Punched Card Tabulator. A machine which is able to automatically fed *punched cards,* reading data from them to be directly listed and/or accumulated for the printing of totals at the end of certain card *groups.*

Punched Card Verifire. A machine which is used to ensure that data punched into *punched cards* remained the same as the data on the original documents from which it got punched. The process of manual punching from original documents was repeated and the machine recognized any difference in key depression.

Punched Tape. Means a tape of fixed width into which information could be recorded by using a pattern of punched holes. Tape is normally of paper, approximately 0·04 in. thick. The width of tape is equal to the number of *tracks* or *channels* it holds, *i.e.,* the number of holes punched across it. The usual widths are 5 track ($\frac{11}{16}$ in.) 6- or 7-track ($\frac{7}{8}$ in.) and 8-track (1 in). Also known as *Paper Tape.*

Punching, Normal Stage. *Normal stage punching.*

Punching Positions. Refer to the places on a *punched card* into which holes could be punched. A punching position is at the intersection of a *row* and a *card column.*

Punching Rate. Means the rate at which information is punched in the form of holes in *punched card* or *paper tape*. In the case of cards the rate was normally determined by the number of cards which could be punched per unit of time and in the case of paper tape by the number of *characters* per unit of time.

Punching Station. Refers to the position within a *card punch* at which a *punched card* was punched.

Punching Track. Refers to the part of a *card punch* which moved the *punched card* through the machine.

Punch Knife. Refers to the part of the mechanism of a *card punch* which made the hole in a *punched card.*

Punch, Zone. *Zone digit.*

Punctuation Bits. *Bits* which are used in *variable field record* systems to indicate the beginning and end of items of infotmation.

Push Down List. A list organization in which the last (newest) item added becomes the first in the list, and is the first to be retrieved. All other items are pushed back (down) one from the previously existing order. *See LIFO.*

Push Down Stack. A set of computer registers or memory locations that uses the push down list concept. *See preceding entry.*

Push Down Store. A *store* working on the principle of a *push down list*, so that as new items of data could be added to the store, previous items could be moved back, the latest item occupying the first *location* in the store. This arrangement of data can be carried out either by *hardware* or by *program.*

Push Up List. Refers to the organization of a list in which the last item stored has been entered at the end of the list, retaining the existing order of the items on the list. *See FIFO.*

Push Up Storage. Refers to a method of storing data that retrieves the items in the same order in which they had been entered; that is, the oldest piece of data has been retrieved first.

Q

Quad. Involving four elements.

Quad Capacity. A floppy disk having double-density, double-sided recording characteristics so as to achieve more storage per disk.

Quantizer. A device which is used for converting an *analog* quantity into its *digital* equaivalent.

Quartz Delay Line. Refers to a form of *acoustic delay line* in which quartz has been used to recirculate sonic signals.

Quasi Instruction. An item of data which is present in a *program* in *instruction format* but never in fact executed as an instruction.

Query. Refers to a term used in information retrieval to refer to a particular request for information.

Query Language. A user friendly set of commands that permit a user to access information from a data base. *See user friendly.*

Queue. Refers to a line of items which are waiting for service or processing, such as data to be processed by a central processing unit, or terminals waiting for access to a system. Requests for service have been usually queued so as to be handled in some designated order.

Queuing Theory. A form of probability theory which is useful in studying delays or lineups at service points It can be applied to the movement of bits of information, auto assembly lines, pedestrian traffic circulation, etc.

QUICKTRAN. It refers to a subset of the programming language *FORTRAN* which was designed primarily for use with *multi-access* systems. The basic program statements have been found to be compatible with FORTRAN, but the language has been extended to include extensive facilities for controlling the *testing, debugging* and *operating* of programs. The use of special statements make the user to *compile*, test and *run* a program from a *remote terminal.*

Quit. A function in a *program* which permits the user to terminate the current process.

QWERTY Keyboard. The name used for the standard typewriter keyboard layout and containing those six letters in one row in that arrangement. This is the keyboard layout which is found in microcomputer terminals. *See Dvorak keyboard.*

R

R. Read (acronym).

Rack-up. Refers to a method of presenting data on a *video* whereby each time the last line of the *screen* gets filled, the first line gets deleted and all lines move up one line, there by enabling a new line to be entered.

Radio Shack A distributor of electronic equipment, hardware and software, including the TRS-80 computers and TRSDOS operating system. All are products of the Tandy Corporation.

Radix. Refers to the base of a number system. For example, the binary system radix is 2; the decimal system radix is 10; octal is 8, etc. *See base.*

Radix Complement. The radix complement of a number could be found out by subtracting each digit of the number from one less than its *radix* and then adding 1 to the result obtained. (For example, the radix complement of the decimal number 171 is 999 − 171 + 1 = 829).

Radix Notation. A generic term which embraces both *fixed radix notation* and *mixed base radix notation.*

Radix Point. Refers to the location of the separation of the integral parts and the fractional part of a number expressed in a *radix notation*. This location could be marked in the decimal system by the decimal point (a dot in English usage, a comma elsewhere).

RAM. Random Access Memory (acronym, pronounce as one word).

Random Access. Refers to the process of obtaining data from or placing data into a storage location in which access is not restricted by sequential search of the data. The order of retrieval has been found to be independent of the order of storage.

Random Access Memory (RAM). This memory storage area for programs and data is immediately accessible to and directly addressable by the central processing unit (CUP). Data could be read from or written into RAM memory location, and the location could be reached through random access. Normally, all user programs are in RAM. RAM differs from ROM (Read

Only Memory) in that RAM can be altered and programs written in, while in ROM no alteration is possible. Another major difference is that information in RAM is not retained if the power is turned off, but information does remain in ROM after the electricity is shut off.

Random Access Storage. A *storage* which is designed to give a constant (or almost constant) *access time* for any *location* addressed and regardless of the location previously addressed.

Random Number Generator. 1. A *hardware* unit which has been designed to produce *random numbers* in specified quantities. 2. A *program* which has been designed to produce random numbers in specified quantities.

Range. A family of *processors* having similar characteristics which are differing in power and size but usually using a common *machine language*.

Range Independence. Refers to a characteristic of *software* which could be processed on any machine in a given *range*.

Rapid-Access Loop. A part of *store* having a faster *access time* than the rest of the storage medium.

Raster. The predetermined pattern of horizontal lines on the viewing screen of the cathode ray tube. The lines have been scanned by an electron-beam and have been spaced to aid uniform area coverage. *See raster scan.*

Raster Scan (CRT display). A display technology in which an image is built from phosphor dots of varying intensity illuminated by the focus of an electron-beam. As the luminescent quality of the phosphor does not last long, continued regeneration by the electron-beam is required to maintain the image. It is the type of system which is used for most black and white, and color, television sets, as well as many computer displays. *See cathode ray tube, interlaced field, phosphor dots, raster.*

Raw Data. Data before they have been processed, which may not be in a form comprehensible to the machine.

Read. To receive data from a device and to interpret them in preparation for processing.

Read Head. An electromagnet which is used to read from a magnetic medium such as *magnetic tape*, *magnetic disk* or *magnetic drum*.

Reading Station. Refers to that part of a *card track* at which holes punched in a *punched card* could be sensed; *e.g.*, by means of a photo-electric head.

Read Only Memory (ROM). A memory circuit written during manufacture that cannot be altered by a user, program, or other means.

Read-only Storage. A device which is able to hold permanent data that could not be altered by *program instructions*.

Read-Out. Refers to *read* from the *internal store* of a computer and transfer it to an *external store*.

Read-Punch Unit. An *input/output device* which is capable of both reading punched data and then punching computed results. If the unit was reading and punching *punched cards* (as opposed to *paper tape*) it might also segregate the newly punched cards from the ones previously input.

Read Rate. Number of units of data (*e.g.*, *characters*, *words*, *blocks*, *fields*, *cards*) which are capable of being *read* by an input reading device in a given unit of time.

Read time. Refers to the time interval between the instant the transfer from a *store* begins and the instant it gets completed. The read time means the *access time* less the *waiting time*.

Read while writing. Means the reading into *store* of a *record* or group of records simultaneously with the writing from store of another record or group of records.

Read/Write Channel. Refers to a channel connecting a *peripheral unit* which has a *central processor*.

Read/Write Head. An electromagnetic device which is used to read from or write to a magnetic storage medium such as a disk or tape. *See digital recording.*

Ready-For-Sending. A signal which is sent by a receiving node in a network in response to a ready-to-send signal, revealing that the receiving unit has established connexion over the line and is ready to accept data transmission.

Real Address. Means an *address* in *main store*.

Real File. A collection of *records* which is created from one or more *primitive files* by using a *record access mechanism* in an *operating system*.

Real Store. Refers to a specific *hardware* storage device in use for a particular activity within an *operating system*.

Real Time. Processing that occurs simultaneously with some physical event, with the purpose of controlling or affecting that event without causing delay. The information must be processed immediately or it will be lost or useless.

Real Time Clock Refers to a device which generates readable signals at regular intervals of time. Such a device finds use in *real time* systems to calculate the actual or *elapsed time* which passes between the occurrence of two events, in contrast to the time, usually much shorter, taken by the computer to compute the time interval.

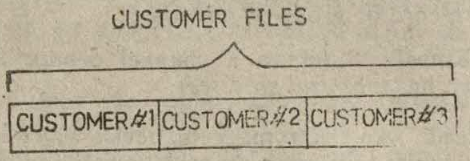
Real Variable. A variable which is expressed in *floating point* format.

Recompile. To repeat the process of *compilation* of a *program*, usually because of *debugging*, or in order to create a version of the program which will run on a different *range* of equipment.

Reconstitution. Refers to the restoration of a *file* to an earlier stage, *e.g.*, as a result of a *dump and restart* procedure.

Record Access Mechanism. Software within an *operating system* which is used to *access data* forming a particular *real file* by using operations on the constituent *primitive files.*

Record. A group of related fields of information treated as a unit for organizational purposes. A record may be one of many within a file. Each record may be similar in form and content; for example, information about a customer. The way a user sees a record is always in its logical (assembled) form regardless of its actual location.



Record

Record Blocking. Refers to the practice of grouping *records* into data *blocks* which could be read and/or written to *magnetic tape* in one operation. This arrangement makes the tape to be read more efficiently and reduces the time needed overall to read or write the file.

Record Count. Refers to a total of the number of *records* in a file.

Record Header. Refers to a *data element* or *field* within a *record* set aside for information needed by system *software*, but not available to the *user* of the record.

Recording Density. Refers to the distance between the magnetized spots on a magnetic *storage device.*

Record List. Information held on a *file* which is presented in readable format.

Record Reference. *Reference listing.*

Record Section. Where a *record* has been held in more than one *block*, that part of the record held in one block.

Recursive Routine Or Procedure. A routine or procedure that calls itself, or calls a different procedure or routine which, in turn, calls the first one again. This type of processing develops a set of levels and is related to tree structures *See tree structures.*

Red-Tape Operations. Operations carried out as part of a *routine,* but are concerned mainly with the organization of the routine itself rather than with the processing of *data.*

Reduction, Data. Taking raw (unprocessed) data and converting them into useful, understandable data.

Redundancy. (1) Use of several devices that all perform the same function in order to increase that function's reliability or accuracy; (2) When transmitting information, the portion that can be permitted to be lost without impairment or loss of crucial information; (3) Those areas or devices that overlap or are repetitious.

Redundancy Check. Refers to any checking operation which depends on extra *character* or *bits* which are attached to *data* to permit the automatic detection of errors. The extra characters do not themselves contribute to the information content of the data, *e g., parity check.*

Redundant Code. Refers to a code in which more *bits* have been used than are strictly necessary for the information to be conveyed; *e.g.*, a 7-bit *paper tape* code in which each character needs 6 *information bits* plus one *parity bit.*

Redundant Recording. A cassette tape recording method where each piece of information is stored twice on the tape as insurance against information loss in the event of damage to any portion of the tape.

Re-Entrant Procedure. A *procedure* that could be entered before a previous activation of the same procedure has been completed, because no interference is caused between more than one activation.

Reference Address. An *address* which is used as a reference point for a group of *instructions* written to have *relative addresses* Thus, for example, an *absolute address* can be obtained by adding a reference address to a relative address.

Reference Listing A list which is printed by a *compiler* to show *instructions* as they appear in the final *routine*, including details of *storage allocation.*

Reference Picture. A *picture* which is able to provide operations staff with information about their activities

Reference Supply. A voltage source which is used in an electrical *analog computer* as a unit by which other voltages can be measured.

Reference Time. Means the time at which an electrical pulse used to initiate some action first reaches 10 per cent of its specified amplitude.

Refresh. The continuing process of regenerating a signal over and over again in a situation where it decays or fades when left idle The cells in a dynamic memory chip and the phosphor illuminated image on a CRT screen are examples.

Regeneration Period. The time that has elapsed while the screen of a *cathode ray tube* store has been scanned by an electron beam to regenerate the charges on the surface of the screen.

Regenerative Reading. A *read* operation which is involving the automatic *writing* of data back into the locations from which it has been extracted.

Regenerative Store. Means a type of storage unit in which signals representing data are constantly being regenerated so that information could be retained for as long as needed. When some new item of data is loaded the regenerating circuit is automatically broken to allow the old data to be *overwritten.*

Regenerative Tracks. On a *magnetic drum* these tracks have been associated with the *read* and *write heads* and are arranged in such a manner that signals get regenerated during each drum revolution to retain data recorded on the drum. Thus each regenerative track and its *read/write heads* acts as a *regenerative store.*

Registers. Temporary storage or processing areas designed for fast access by the microprocessor unit (MPU). They are usually internal to the MPU and directly addressable to it (more quickly than main memory).

Register Length. The number of *characters* or *bits* that could be stored in a particular *register* within the *register capacity.*

Regression Analysis. Found in statistical analyses, a means of determining rate of change.

Relative Address. A number which is used in the *address* part of an *instruction* for specifying a required *location* with respect to a *base address.* The *absolute address* could be obtained by adding the *base address* to the relative address.

Relative Addressing. Means a system of *programming* in which *instructions* have been written so that they do not refer directly to *absolute addresses* in *memory*; instead a *base address* has to be added to the address component of each instruction when the program is loaded so as to create numbers that refer to absolute *locations.*

Relative Coding. Writing *program instructions* by using the techniques of *relative addressing.*

Relay Amplifier. A device which is used in an *analog* system for comparing two signals which incorporates an amplifier that drives a switch.

Relay Centre. A *switching centre* in which message signals have been received and. automatically directed to one or more output circuits in accordance to data contained in the message itself.

Release. Because of an action carried out by an operator, by a *program instruction* or automatically by an *executive program,* to release a *peripheral unit* or a *memory* area from the control of a particular program. The *hardware* released gets available for allocation to some other *program.*

Relocatable Code. *Relocatable program.*

Relocatable Program. A module of an object program or routine that does not have a fixed address and that is structured so that it can be moved and executed from any location in main memory without loss of effitiency.

Relocate. Means the automatic *modification* of the *instructions* in a *program,* which is undertaken to permit the program to get *loaded* and executed in any specified *memory* area.

Remedial Maintenance. Maintenance work done on equipment to repair some machine fault. It is classified as *fault time* or *down time* and not as part of *scheduled engineering time.*

Remote. It is said to be any *peripheral unit* which operates at a distance from the host, involving some form of *data communication.*

Remote Batch Printer. Refers to a *printer* which is *remote* from the *central processor* which accepts data in *batch processing mode* for subsequent *off-line* printing.

Remote Calculator. A *keyboard* device which is connected directly to a *central processor* via some *data link* to help users at remote locations to present problems needing calculation to the computer.

Remote Computing System. Means a hardware configuration in which *remote consoles* have been connected directly to a computer to make users to have direct communication with the *central processor*. Users may *compile*, *test*, *debug* and execute their *programs* from these remote terminals. Proven programs have been stored centrally on some *mass storage* device and could be called into *memory* as needed.

Remote Computing System Exchange. A device handling messages and data transmitted between a *central processor* and *remote consoles*. The exchange device is helpful in making a number of remote consoles to be operated simultaneously without mutual interference

Remote Computing System Language. A language which is used for communication with a central computing system from *remote consoles* For example, *program statements* are often written in *FORTRAN*.

Remote Computing System Log. Refers to a record of events which are occurring during the operation of *remote consoles* ; it may be printed but is often recorded on some other output medium to make analyses to be subsequently generated.

Remote Console. A terminal unit which is used in a *remote computing system*. A number of these distant consoles may be available, each equipped with facilities for sending and receiving data to and from the *central processor*. Connexion to the processor is usually done via a *remote computing system exchange*. The console itself is a work station having a greater or lesser degree of intelligence.

Remote Data Stations. Remote *terminals* which are capable of sending data to, and receiving data from, a central computer.

Remote Debugging. Means the testing and correction of *programs* from a *remote console* as used in a *remote computing system*.

Remote Inquiry, Real Time Refers to a system in which distant terminals have been connected to a *central processor* to help users to interrogate the system and get information from data files.

Remote Job Entry. Refers to the input of data direct to a central computing system by a device which is remote from that system.

Remote Processing. Pertaining to a system in which data has been transmitted as messages from distant stations to get processed by a central computer.

Remote Processor. A *processor* located away from a computer's *central processor* but whose activities have been under the overall control of the central processor's *operating system*.

Reorganize. Means copying *data* into a new part of *filestore*, either because the user needs changes to the data format, or because the current *storage* structure is becoming inefficient (*e.g.*, because the file contains dead *records*).

Repeat Counter. A software counter that is able to record the number of times an event takes place in a program for later comparison.

Repeat Key. (1) A key that can be held down so that it repeatedly makes contact without need for additional depression; (2) A key which is pressed at the same time as another key in order to make the second key repeat for the duration of the time that the repeat key is depressed. For example, it can be used in combination with the cursor movement keys in order to move rapidly across the screen.

Repeatability. Refers to the ability of a device to minimize variation each time it performs a repetitive operation that is based upon a constant input signal. It is generally expressed as a percentage of error.

Repair Delay Time. Time which is lost due to the inability to repair equipment because of lack of test equipment, spare parts or service staff.

Repertoire. Refers to a range of *characters* or separate *codes* which are available in a particular system of coding.

Repetition Instruction. Means an *instruction* that can cause an instruction, or group of instructions, to get repeated a specified number of times.

Repetitive Addressing. A system which is adopted in some computers in which, under certain conditions, *instructions* could be written without the quoting of an *operand address*.

Repetitive Operation. Referring to *analog computers*, a technique in which a solution has been generated successively using the same equations and *parameters*, so as to display the solution as a steady graph on a *visual display unit*.

Replication. Refers to the use of more than one identical *hardware* unit in a system in such a way that the units become interchangeable in the event of *failure*.

Reply. A *message* which is generated in response to an earlier message.

Report. A general term for any printed analysis of data which is produced by a computer, *report program*.

Report Generation. Production of a report as output, requiring only the specification of the arrangement and content desired, and designating existing data as input.

Report Generator. A program that generates a report using designated specifications and existing data.

Report Program. A *program* which has been designed to print out an analysis of a data *file*.

Reproducer. A *punched card* machine which is capable of reading a *pack* of cards and transferring information to be automatically punched into another set of cards.

Rerun. To repeat the execution of a *program*, usually because of an error condition.

Rerun Point. A point in a *program* from which it becomes possible to *restart* following an error or a machine failure.

RES. Reret signal (acronym, pronounce letters individually).

Rescue Dump. Means a technique in which the contents of *memory* have been periodically output to a *backing store*, in order that the *data*, *intermediate results* and the *program* of *instructions* could be preserved as at a particular step.

Reservation. Implies the allocation of *memory* areas or *peripheral units* to a particular *program* in a *multiprogramming* computer.

Reserve. Involves the assigning of a *memory area* and/or *peripheral units* to a particular *program* which is operating in a *multiprogramming system*.

Reset. 1. In *programming*, it refers to set a *counter* to zero, or to return an *indicator* to some stable condition. 2. On a *punched card machine*, it refers to zeroize a *counter*.

Reset Cycle. To return a *cycle index counter* to its original value.

Reset Mode. Referring to an *analog computer*, a state during which the initial conditions have been applied to the system.

Reset Pulse. One of the pulses that it able to control the state of a *storage cell*, specifically one that tends to restore a cell to the *zero condition*.

Resident Routine. A *routine* existing permanently in *memory* ; *e.g.*, a *monitor routine* of an *executive program*.

Residual Error. An error which is generated during an experiment.

Residual Error Rate. In *data transmission*, it refers to the ratio of undetected or uncorrected error incurred in transmitting a given volume of data.

Residual Value. The value of a piece of equipment at the end of a lease term.

Residue Check. Refers to a check performed to verify an *arithmetical operation* in which each *operand* has been divided by a number which generates a remainder that accompanies the operand as a *check digit* in subsequent operations.

Resilience. Pertaining to the ability of a system to continue operating in the event of *failure* of part of it; in this event the system may be considered to be operating in *crippled mode.*

Resolution. Implies the number of individually addressable and variable *picture elements* which are available in a *graphic display.*

Resolving Potentiometer. A potentiometer which is used to operate as a *function generator*, in which the output variables have been Cartesian coordinates of a point and the input variables polar coordinates.

Resource. Means any part of a computer system or *configuration* which can be regarded as a separate unit for the purpose of allocation for the use of a specific *process.*

Response. In an *information retrieval* system, it refers to the information returned to the user because of initiating a query.

Response Duration. Means the interval between the *time origin* of a pulse and the time at which the pulse falls below a specified operating value.

Response Time. The time needed to answer an inquiry.

Restart. To return to a previous point in a *program* so as to start again following an error or machine malfunction.

Restart Point. Means a point in a *program* that permits the program to be reentered so as to effect a *restart* following an error or machine failure .

Restore. Means setting a *counter, register, switch or indicator* to some previous value or condition.

Result. A quantity or value der ived from some *arithmetica* or *logical operation* which is being carried out upon one or/ more *operands.*

Retained Peripheral. A *peripheral unit* previously used on one type or *range* of processors but subsequently used on a different range of equipment.

Retention Period. Means the length of time (measured in days | weeks/months) for which date on a *reel* of *magnetic tape* ha s to be preserved, *i.e.*, before the tape may be *overwritten.*

Retrieval. Means the extraction of *data* from a *file* or files by searching for specified *keys or labels* persent in *records* stored on the file. Records may be selected in accordance to logical relationships between *fields* and may be processed or summarized to produce the required information.

Retrofit. Updating of or adding to an existing system in order to improve it or to accommodate change.

Return. (1) An instruction used at the termination of a subroutine causing control to return to the main program; (2) *See carriage return.*

Return Instruction. An *instruction* carried out to return to a main *routine* after the execution of a *subroutine*.

Return-to-Bias Recording. Refers to a method of *return-to-reference recording* in which each storage cell gets permanently energized to a predetermined bias condition.

Return-to Reference Recording. Refers to a system for recording information in *magnetic cells*, in which each cell could be magnetized to represent the *binary digit* 1 by applying energy to change the condition of the cell with respect to some predetermined reference condition.

Reverse Poilsh Notation. The procedure used in some calculators, such as Hewlett Packard's, for basic arithmetic functions. To use such a calculator, you must learn a specialized method for entering calculations.

Reverse Video. A cathode ray tube (CRT) display technique that shows dark characters against a light background for emphasis.

Reversible Counter. It is a *counter* in which the value stored could be incremented or decremented in accordance to a specified control signal.

Reversible Magnetic Process. Refers to a process whereby the flux within a magnetic material returns to its previous condition if the magnetic field is removed.

Revolver Track. On a *maganetic drum*, it refers to a track which acts as a *regenerative store*, *regenerative track*.

Rewind. To reposition a *magnetic tape* to the *laod point* (*i.e.*, so that the tape is ready to *read* from the beginning).

Rewrite. The process of putting out information to memory or a storage device.

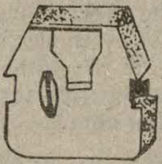
RF. Radio Frequency (acronym, pronounce letters individually).

RF Modulator. (Radio Frequency modulator). A device that adapts a computer output signal so that it can be used with a standard television display. The RF modulator encodes the composite video output from the computer into a radio frequency signal for display on the television set.

RGB. Refers to the initial letters of red, green, blue, which are pertaining to the three primary colours used in a *cathode ray* display to create colour images.

RGB Monitor. Red, Green, Blue monitor (acronym, pronounce letters individually). A type of color monitor having separate inputs for red, green and blue. It is needed for high resolution color images. The red, green, and blue signals must be sent separately.

Ribbon Cable. A flat cable having a number of wires which are running parallel to each other, separately insulated. Ribbon cables are used for connecting *peripheral units* to *processors,* typically via a *parallel interface.*



Ribbon Cartridge

Ribbon Cartridge. The plastic holder and feed device for a printer ribbon. They vary considerably by type of printer.

Right Shift. A *shift* operation in which digits of a *word* get displaced to the right. In *arithmetical shift* this involves the effect of division.

Ring Counter. Refers to a series of interconnective storage elements which are arranged in a loop. Only one element at any instant can exhibit a specified condition, and as input signals are counted this condition gets displayed by successive elements around the loop.

Ring Network. Refers to a *network* in which the topology is that of a continuous circle, with *nodes* represented as points on the circumference. Messages between nodes have to pass through all intervening nodes on the ring.

Ring Shift. Means a *shift* operation in which digits expelled at one end of a register return automatically at the other end.

Rise Time. Means the time needed for an electrical pulse to rise from onetenth to nine-tenths of its final value.

RJE. Abbreviation of *remote job entry.*

RJE Mode. Refers to a method of operating a computer system whereby *jobs* have been submitted from *terminals.*

RO. Read Only (acronym, pronounce letters individually). The ability to just read information from memory or storage, and not to write to it.

Robot. A device which is capable of receiving input signals consisting of commands or information about environmental conditions, and then using the information as a basis for performing mechanical, repetitive tasks. Robots are used primarily in industry to increase productivity, to free workers from mundane tasks, and to repair and make other machines.

Robotics. A field of study that is involving the use of robots to perform tasks in industrial and other environments.

Role Indicator. A code which is associated with a *keyword* to identify it as a noun, verb, or adjective, etc.

Roll in. 1. Refers to the activating a *process* in an *operating system* by bringing parts of the process successively into *main store*. 2. An action carried out by an electro-mechanical *counter* on a *punched card tabulator*, in which the counter unit is receiving impulses representing numeric valuse read from a *card field* or emitted from another counter.

Roll Off. Means the process by which a *primitive file* has been copied from a specific *physical storage medium* or volume into *low level filestore*, *overwriting* any version of the file currently existing in filestore.

Roll on. Refers to the process of copying a *primitive file* from *low level filestore* into a specific type of *volume*.

Roll Out. Means removing a *process* from *main store*.

Roll Over. A keyboard encoding mechanism that eliminates error when more than one key is pressed at the same time.

ROM. Read Only Memory (acronym, pronounce as one word).

ROMable Code designed to be placed in ROM memory.

Rotations. In computer graphics, the turning of a computer-modeled object relative to an origin point on a coordinate system.

Round. Means altering the value of digits at the least significant end of a number, so as to allow for digits to get removed in *truncating* the number.

Rounding Error. An error in a result that is attributable to *rounding off*.

Rounding off. Refers to the process of adjusting the *low order* digits of a number so as to reduce the effect of *truncation*.

Route. 1. Synonymous with *channel* but used in connexion with *operating system* and *network*. 2. The path taken from an index page to an *end page* in a *tree structured data base*, typically a *videotex data base*.

Routeing. Means a method of linking *records* within a *tree structured data base*.

Routine. A set of coded instructions which are arranged in a proper sequence to direct the computer to perform a specific action. A program may have many routines, although a routine itself may be considered a program.

Routine Maintenance. Maintenance work which is carried out in accordance to a schedule which is usually as recommended by the equipment manufacturer, to prevent equipment failure. The work usually includes testing, repairing, replacing, cleaning and adjusting components. It is also known as scheduled maintenance.

Routine Maintenance Time. Computer time which has been assigned for carrying out *routine maintenance* work.

Routing. Meaning *message routing* in a system in which a central computer gets attached to a communications network to receive and direct messages to their required destinations.

Routing Indicator. In *message routing* systems a group of *characters* or *digits* which forms part of a message and specifying a required destination.

Row Binary. In relation to *punched cards*, it refers to a method of representing numbers by considering consecutive *punching positions* on each *row* of a card as consecutive digits in a *binary number*.

Row Pitch. Refers to the distance between the holes which are running lengthwise along a punched *paper tape*. It is measured from centre to centre of consecutive positions.

RPG. Report Program Generation language (acronym, pronounce letters indiviually). A high level programming language which is popular for business applications.

RPROM. Reprogrammable Read Only Memory (acronym, pronounce first letter individually, rest as one word).

RST. Restart (acronym, pronounce letters individally).

RS-232 or RS-232C. A widely used electronic industry standard (EIA) connector for interfacing computers to peripheral devices. EIA standard RS-232C specifically defines a 25-pin connector and the date and control circuts and signals required to interface a terminal and a modem. The standard also is used in the intercommunication of other serial peripheral devices.

RS Series. An abbreviation for Requirement Specification which has been set by the Electrical Industries Association of the USA. A number of these specifications refer to the intercon-nexion standards for computing devices. The most common RS series standard are RS232, RS422 and RS423.

RTC. Real Time Clock (acronym, pronouce letters individually).

Run. Refers to the performance of one *program or routine*. It is related particularly to *batch processing* applications.

Run Book. Means an operating guide for assembling the necessary materials and data for running a job. It includes a complete set of *operating instructions* for a *run* or *suite* of runs.

Run Chart. A *flowchart* which shows a *run* or series of runs which are combined to form a single *job.*

Run Duration. The time needed to execute a particular *run.*

Run Length Encoding. Refers to a method of encoding graphics data whereby the coding scheme is describing the characteristics of each horizontal line of the graphics image.

Run Locator Routine. A *routine* which could locale a specified *program* on a *program tape.*

Running Accumulator. A storage unit which consists of a number of *registers* connected in such a way that data could be passed successively from one to another.

Run Time. Refers the time during or at which *program* is *run.*

R/W. Read/Write (acronym, pronounce letters individually).

S

S-100 Bus. A 100 line *highway* standard which is used in small personal computers.

Sampling. Refers to the process of recording the value of a *variable* at intervals of time.

Satellite Processor. The term used for a *processor* which forms part of a larger *data processing* system and whose function is to process *runs* which are subsidiary to the main work of the system.

Save. To permanently record and store a program or data on a storage device such as a floppy disk.

SBC. Single Board Computer (acronym, pronounce letters individually).

Scan. Means examining every item in a list, or *record* in a *file,* usually as part of an *information retrieval* system in which each item has been tested to see whether or not it satisfies certain conditions.

Scanner. A device automatically carrying out *sampling* and initiating required operations in accondance to the values obtained.

Scatter Read. Refers to the process of distributing data into several areas of *store* from a single *input record or block.*

Scheduling. Means the operation of the sequence and priority in which *jobs* have to be run, and the allocation of *resources* to jobs. Scheduling may be performed manually by operators or may be part of the function carried out by an *operating system*.

Schema. A complete description of a *data base*.

Schematic. A drawing showing component interconnections of a circuit.

Schematic Symbols. Stylized line drawings that represent various elements and are used universally. *See logic diagram.*

Schottsky Circuits. A circuit technology characterized by high speed and high power consumption.

Scientific Computer. A computer which is used for *scientific data processing.*

Scientific Languge. A *language* which has been designed for the writing of mathematical or scientific *programs*.

Scientifie Notation. A technique for expressing quantities as powers of ten, for example, $12300=1.23 \times 10^4$.

Scratchpad. An area of read/write memory used as a temporary work area.

Scratch Pad Memory. An area of *memory* which is reserved for intermediate results. Synoymous with *work laber area.*

Screen Dump. The transfer of data or images from a terminal display to storage or to a peripheral device in order for it to be printed.

Screen Mode. Means a technique of operating a *video* by which pages of information are formatted for the device.

Screen Size. The physical viewing dimension of a cathode ray tube (CRT) screen, usually expressed as a diagonal measure in inches. Screen size does not limit screen resolution.

Screen Type. The technology of the display; for example, cathode ray tube (CRT), liquid display (LCD), light emitting diode (LED), etc.

Scrolling. Moving text vertically or horizontally on a cathode ray tube (CRT) screen so that portions which do not fit on the screen at one time can de viewed. *See horizontal scrolling, vertical scrolling.*

Search and Replace The ability of a word processing program to find a specified character, word, or string each time it appears in the text, and to replace it with another character, word or string.

Search Time. Refers to the average time which is required to identify an item of data satisfying a specified condition.

SECAM. Acronym for Sequential Coleur A Memoire. A colour television broadcast standard which was developed in France and is being used in a number of countries, including the Soviet Union. Colour difference signals have been transmitted sequentially. SECAM is using 625 picture lines and a 50 Hz field frequency.

Second Generation Computers. Machines which were built with transistors, as opposed to *first generation* (thermionic valves) and *third generation* (*integrated circuits*) Also, see *fourth* and *fifth generations.*

Sector. An organization of data storage on a magnetic disk, where data are stored and accessed in a system of tracks and sectors.

Seek. Synonymous with *search.*

Seek Area. In a *direct access* store (*e.g.*, a *magnetic disk file*), it refers to an area of storage which is assigned to hold specified *records* and chosen to allow rapid access to the records concerned in accordance with the physical characteristics of the device. It is also known as cylinder.

Seek Time. In a disk system, the time needed to move the read/write head to the required track position for a read.

Segment. A division of a program or a file in memory.

Segmented Program. A *program* which is written in separate *segment* or parts.

Segment Mark. A *character* which is used to separate section of a *tape file*

Segregating Unit. A *collator* which is used to select from a card file *punched cards* satisfying certain conditions.

Select. To make a choice between alternative courses of action as a result of a *test*

Selecting. A method by which the transmission of information to remote *terminals* has been controlled by carrying the *address* of the receiving terminal in the *block* being transmitted.

Selective Digit Emitter. A device in *punched card* machines which could simulate signals usually generated by particular punchings.

Selection Sort. A sorting technique where one key (item of data) is designated as the lowest or highest. Then all of the remaining item in the list are compared and ordered in relation to that first key piece of data.

Selective Trace. A *trace program* in which only specfied *instruction* types or *store* areas have been analysed.

Selector. A device which is able to test for the presence of specified conditions and initiates appropriate operations in accordance to the result of the test.

Selector Channel. It several *peripheral units* are connected to a *central processor* by a single *channel*, the selector channel is able to control the transfer of data between each peripheral unit and the central processor.

Self-Reseting Loop. A *loop* which has *instructions* restoring all *locations* affecting the operation of the loop to their original condition as at entry to the ioop.

Self-Test. Refers to the ability of a device, such as a printer, to run through its entire instruction set and to test the internal circuitry to be sure it is working properly before proceeding with a specific task.

Self- Triggering Program. A *program* which starts operating as soon as it is placed in a *central processor trigger*.

Semantic Error. Using the wrong *instruction format* for the *operation* required.

Semantics. Deals with the study of the relationship between symbols and their meaning.

Semiconductor. A material serving as an electronic conductor and is having a resistance between that of a metal and an insulator. I's electrical conductivity is sensitive to the presence of impurities and it varies with changes in the temperature around it. At high temperatures it more closely resembles metal and has high conductivity, while at low temperatures it resists the electron flow. This property makes the element suitable for use as a transistor, functioning as a switch in a computer circuit.

Sensing Station. Refers to the position within a *punched card* machine at which a card was read, e.g., by means of sensing brushes.

Sentinel. A *character* used to indicate the occurrence of a specified condition. For example the physical end of a *magnetic tape*, or the end of a *variable length record* in *store*.

Separator. A *character* which is used to separate logical units of data, *e.g.*, *fields*, *records*.

Sequence. 1. To keep a set of items into some defined order of the *keys* used to identify the items, *e.g.*, to place a set of names into alphabetic sequence. It is also known as order. 2. Any set of items or instructions which are placed in a defined order.

Sequence Check. A check which is designed to ensure that an ordered set of items is in the expected *sequence* of *keys*.

Sequence Check Routine. A routine which checks that a set of items expected to be in a defined *sequence* is in fact in the correct order.

Sequence Control Register. A *register* whose contents decide the next *instruction* to be performed.

Sequence Error. An error which is detected by a *sequence checking routine.*

Sequential Access Storage. A *storage device* in which data is only *accessed* in the sequence in which it is stored in the device.

Sequential Control. Refers to a method of computer operation in which *instructions* have been stored in the order in which they are executed.

Sequential Processing. Refers to processing *records* in a data *file* in accordance to some predetermined sequence of *keys.*

Sequential Stacked Job Control. A control system which ensures that jobs are under taken in the sequence in which they are presented to the system.

Serial. To deal with items of information or *instructions* in sequence; contrasted with *parallel.*

Serial Access. The process of obtaining data in a sequential fashion, so that in order to access an element all the preceding elements in that group must be searched through. Typically, this is the slowest of the access methods. Same as sequential access.

Serial Attribute. A coding system which is common in *videotex* and *teletext* systems. In this the attributes of a character (*e.g.,* colour, ze) are represented by a code within the coding scheme which gets transmitted and stored, but not displayed or printed (unless a special command is effected).

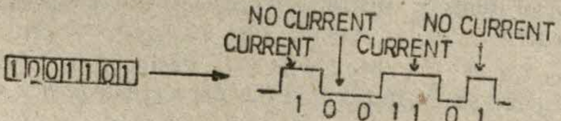
Serial Feeding. Refers to a method of feeding *punched cards* in which a card entered the *card track* with (for 80-column cards) column 1 or 80 leading.

Serial Interface. An *interface* in which *serial* transfer of data takes place between *peripheral units* and a *processor.*

Serial Processing. Processing *records* in a data file in the order in which they occur in a given *storge device.*

Serial Transfer. Refers to transfer of data in which each unit of data being transferred travels in sequence.

Serial Transmission. The transmission of data in such a way that all the bits in a byte are handled one after another. *Contrast with parallel transmission.*



Serial Transmission

Serviceability. Refers to the reliability of equipment which is based on some objective criterion. Various criteria for assessing serviceability are adopted.

Service Routines. *Routines* whose purpose is to carry out all functions associated with the maintenance and operation of a computer and the preparation and correction of *programs.* Service routines are normally *general purpose programs,* and are including *exceutive* routines, *compilers, generators,* and *assemblers, debugging routines, diagnostic routines* for *hardware* checking, and general *input/output* routines.

Servo. Synonymous with *servo-mechanism.*

Servo-Mechanism. A powered device for controlling operations. It is activated by a difference in the actual and desired values of the quantity under control and acts so as to minimize the difference.

Session Level. In the *ISO seven layer reference model,* it refers to the fifth level of codes which establish, maintain and terminate logical connexions for the transfer of data between end users.

Set. 1. To keep a desired value into a storage *location.* 2. To give a *bit* the value one.

Set Pulse. A pulse having the property of *setting* a *bit.*

Seven Layer Reference Model. Means a model for communication *protocols,* which is so designed to allow *open system* interconnection between computer equipment with different protocols. The seven layers include. (i) *physical level*; (ii) *data link level*; (iii) *network level*; (iv) *transport level*; (v) *session level*; (vi) *presentation level*; (vii) *application level.*

Several-for-One. Refers the association of several *machine language instructions* with a single *source language statement.*

Shared Data Base. A *data base* which could be *updated* and *accessed* simultaneously by users in different physical locations, communicating with the data base aver a *network.*

Shared Files System. Refers to a system in which more than one computer is able to *access* information stored on one *direct access storage device.*

Shift. The operation of moving the binary contents of a storage register one or more bits to the left or right within the register in order to multiply or divide

Shift Register. A *rigister* in which the data stored can be subjected to a right or left *shift.*

Short-Line Seeking. If a line to be printed does not span the entire page, the printer performs a carriage return at the end of the short line and begins to print a new line, speeding up printer performance.

Sideways feed. Refers to a method of feeding *punched cards* in which a card is kept in the *hopper* in such a way that it enters the *card track* with one of its long edges leading.

SIG. Special Interest Group (acronym, pronounce as one word).

SIGGRPH. Special Interest Group for Graphics (acronym, pronounce as one word). A non-profit organization devoted to the advancement of computer graphics.

Sight Check. Refers to checking that holes punched in two or more *punched cards* are identical by holding the cards together and looking through the pattern of holes.

Signal. 1. Any electrical pulse transmitted over a *network* which can be used to represent *bits* which make up a message or control information. 2. A specific code in a network system which is a able to control the handling of messages and the set-up maintenance and clearing of connexioos.

Signal Conditioning. Modifying a signal so as to make it comprehensible to a particular device.

Signal distance. Refers to the numbes of corresponding *bit positions* which differ in two *binary words* of the same length, *e.g.* the signal distance between the two following 6-bit words is 3.

100101 and 001100

Signalling Rate. Refers to the rate at which signals have been transmitted in communications system ; measured, for example, in *bits* per second.

Signal Regeneration. Restoring a signal to its original specification; a form of *signal standardization.*

Signal Reshaping. Synonymous with *signal regeneration.*

Signal Standardization. Using one signal for generening another which usually conforms to more stringent conditions.

Sign Bit. A *sign digit* which is composed of a single *bit.*

Sign Digit. A *character*, normally at the end of a value *field* or *word*, which is used to indicate the algebraic sign of the value.

Signed Field. A *field* having a number which incorporates a *sign digit* indicating the *sign* of the number.

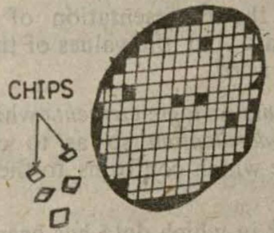
Significant Digits. Refer to those *digits* or *digit positions* in a number woose values are known and are relevant to the precision of the number.

Significant Figure. The number of digits in a number which are known to be entirely correct or to be meaningful for further use. For example, in computer calculations numbers often are rounded off due to the restrictions of the word size. An these rounded-off numbers are used in additional calculations, and are subseqently rounded off in turn, the numbers farthest to the right become less and less accurate. Therefore, although the computer may come up with a result that has 9 digits (as in 1.23456789) the last five digits may be meaningless because they have become distorted by the calculation process itself. In this case, the number would be said to have "four significant figures": 1.234.

Sign-Reversing Amplifier. A device in which the output voltage is having the same magnitude the input voltage but is of opposite sign.

Silicon Chip. A device which is composed of the non-metalic semiconducting element silicon. It contains a set of *integrated circuit*, reduced to a very small size, with resulting low cost and high speed performance.

Silicon Wafer. A silicon ingot slice on which integrated circuits have been fabricated. After fabrication and testing the wafer is cut into individual chips, that are than used as finished integrated circuit components.



Silicon Wafer

Simplex. A communications line that carries data from one point to another, in only one direction.

Simplex Channel. A communications *channel* which permits data to be transmitted in one direction only.

Simulator. A system, either *hardware or software* which is designed to perform the *simulation* of some real process.

Simulator Routine. An *interpretive routine* which is designed to enable *programs* written for one computer to run on a different computer.

Simultaneity. Refers to a feature by which certain *operations* in a *program* can be undertaken concurrently with others.

Simultaneous Access. Keping data into *store*, or retrieving data from store, by means of *parallel transfer* of all elements of the unit of data.

Simultaneons Computer. A computer having a unit giving it *simultaneity* of operation.

Single Address Instruction. An *instruction format* having only one *operand* address.

Single Bit Error. A data transmission error in which a single *bit* in a sequence gets inverted (*i.e.*, 0 becomes 1 or 1 becomes 0).

Single Board Computer. A complete computer, including ROM, RAM, CPU, and I/O interface, implemented on a single printed circuit board. These frequently are used for industrial control applications.

Single Column Pence Coding. A *punched card* code which makes the value 0 to 11 to be represented by a punching in a single *card column*.

Single Density. Means the recording density for *data storage* which is available with the first generation of 8 in. diameter *floppy disks* (between 50k and 90k *bytes*).

Single-Ended Amplifier. An amplifier which is developed only one out-put signal.

Single Length. Refers to the representation of numbers in *binary* form in such a way that the values of the numbers could be obtained in a single *word*.

Single Shot Circuit. *Circuits* or *logic elements* which are arranged to perform *single standardization* so as to convert an imprecise input *signal* into one which conforms to the requirements of a particular machine.

Single Sided. A *floppy disk* in which data has been recorded on only one side surface. Contrasted with *double sided*.

Single Step Operation. Refers to a method of operating a computer in which the *instructions* in a *program* are undertaken one at a time in response to an engineer's or operator's intervention. Single step operation is usually carried out during *debugging*.

Sizing. Deals with the evaluation of the resources and facilities required to perform a data processing task, to achieve a specified service at a cost commensurate with the user's requirements.

Skeletal Code. An incomplete set of *instructions* which forms part of a *general routine* and gets completed by means of *parameters*.

Skip. Means a computer *instruction* in which no operation is undertaken other than a jump to the next instruction in sequence.

Skip Sequential Access. Refers to a method of *file access* in which each successive access needs a *record* with a *key* higher than that of the previous access.

Slave. A device operating under the control of another device.

Slave Computer. A computer operating under the control of another computer.

Slave Store. A *store* which is able to compensate for the different speeds of operation of storage units which must interact.

Slot. A means of expanding microcomputer capabilities by adding circuit boards for specific applications. Slots are the receptacles that handle these boards.

Slot Bound. A situation in which the expansion of a microcomputer system gets restricted by the number of expansion slots available to it.

Slow Time Scale. A *time scale* which is greater than the unit of time in the physical system being studied.

Smart Card. A plastic card like a credit card having an updatable microprocessor.

Smart Peripheral. A peripheral device, such as a terminal or printer, having its own processor and memory so that it may relieve the host system of many functions normally associated with the functioning of that peripheral. Sometimes known as an intelligent peripheral.

Smart Terminal. A peripheral device which is used for data input and output, and which most often has a combined keyboard and CRT screen. A smart terminal has its own microprocessor and control electronics, allowing it to be useful "off-line" for certain functions. If it is "no-line," it may relieve the host processor and main memory of some duties associated with display. *Contrast with dumb terminal.*

Smash. Refers to the destruction of an area of memory or program by overwriting with another segment of memory or program.

SNA. Abbreviation of systems network architecture.

Snapshot dump Refers to a *dump* of selected parts of *store* which can take place at various points during the running of a *program*, usually for *debugging* purposes.

SNOBOL. String Oriented Symbolic Language (acronym, pronounce as one word) A high level programming language which is geared toward manipulation of character strings.

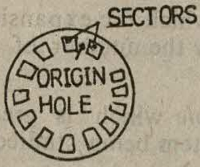
Soft Copy. Output from a computer process which has been displayed on a *visual display unit*. Contrasted with *hard copy*.

Soft Error. A transient, unpredictable fault which is usually associated with software rather than harware.

Soft-Keys. Keys that can be defined in software for any non-printing non-display character functions such as erase-block, move, etc. Also function keys.

Soft-Sector. A floppy disk formatting technique which is accomplished by software. The locations of sectors have been determined by the distance of each sector from a photoelectrically sensed starting mark. Disks have been sectored by the operating system during initialization.

Software. Instructions and programs which tell the computer what operations to undertake. *Contrast with hardware.*



Soft-Sectored Disk

Software Package. Ready-made programs which are offered by vendors or manufactures to satisfy specific needs. Packages usually include the programs, stored on recording media, and documentation or tutorials.

Software, Public Domain. *See public domain software.*

Solids Modeling. Geometric modeling of an object by construction of a computer model based on the measurements, properties, and relationship of points, lines, angles and surfaces of the object.

Solid State. Electronic components which are known for reliability and economy, and control electrons within solid materials (semiconductors). Their small size and suitability to mass production techniques have revolutionzed electronic applications.

Solid State Computer. A computer which is built primarily from circuits and components containing semiconductors.

Sort. (1) To arrange data items according to identification criteria, such as identification (ID) number, alphabetical or numerical order, etc; (2) Rearrangement of inputs records to result in an ordered output file according to specified "keys," such as city, state, street, license number, etc.

Sorter. A *punched card* machine which is able to fed cards into several *pockets* in accordance to the punchings present in specified *card columns.*

Sort Generator. A *generator* in which the *object program* has been designed to *sort* a set of items into a given sequence defined by the *parameters* specified to the generator.

Sorting Needle. A needle which is used to probe a *pack* of *punched cards* so as to establish that a particular punching was common to all cards in the pack.

Sorting Routine. A *routine* which is able to arrange items of data into sequence in accordance to the values contained within specified *fields* (*key words*) of the individual *records.*

Source™, The. An electronic information service operated by Source Telecomputing Corp., a subsidiary of The Reader's Digest Association, Inc. It is available to the public on a subscription basis and offers access to large data bases of varied information, electronic mail, shopping, software reviews, bulletin boards, etc.

Source Computer. A computer which carries out the *compliation* of a *source program*, contrasted with an *object computer*, which is the computer on which the *object program* will be run.

Source Document. An original document from which data has been prepared in a form which is acceptable to a computer.

Source Language. A programming *language* which could not be directly processed by the *hardware* of a computer but needs *compilation* into an *object program* which consists of *instructions* in a *machine language* which can be directly understood by the computer. Examples of such languages are *COBOL, ALGOL, FORTRAN, PL/1.*

Source Module. A unit of *source code* which can be *compiled* as a single unit.

Source Program. A program which is written in a *source language.*

Space. Binary 0, or no voltage.

Space Division System. A system in which *multiplexing* has been effected by *frequency modulation.*

Space Suppression. Inhibiting the normal movement of paper in a *printer* after a line of *characters* has got printed.

Spanned Record. A group of one or more *record sections* which together constitute a record but which span consecutive *blocks.*

Special Characters. Refers to *characters* in a *character set* which are neither letters nor numerals, *e.g.*, !,",/, @, £, etc.

Special Interest Group. (SIG). People who meet to discuss and exchange information about a specific computer-oriented interest, such as computer graphics, robotics, education, business applications, word processing, etc.

Special Purpose Computer. A computer which is specially designed to solve problems of a restricted type.

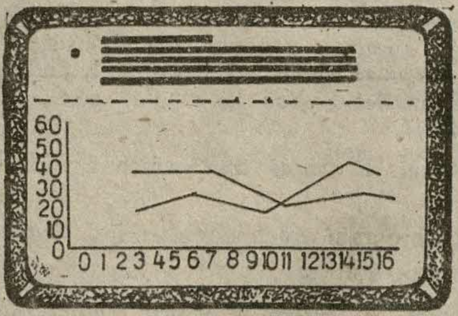
Speech Synthesis. The generation under *micoprocessor* control of sound patterning which simulates a human voice.

Speech Synthesizer. A device that creates representations of speech from electronic phonemes using a set of rules that describe English pronunciations. It enables the computer to "talk" to its user.

Spelling Checker. Software that proofreads by comparing each word in a text file to a dictionary, then marks and/or indicates misspelled words.

Splicer. A hand-operated device which is used to join together two pieces of *paper tape* in such a manner that they can be satisfactorily *read* by a *paper tape reader*.

Split Screen. A CRT screen display in which the software divides the screen into two or more separate sectional areas for independent viewing of portions of graphics, text, etc.



Split Screen

Split-Word Operations. *Operations* which are able to process part of a *word*, as distinct from the whole word, which is the normal unit of data on which operations are carried out.

Spool. Properly, the mounting for a roll of *paper tape*, but also used to describe a coiled length of paper tape.

Spooling. Temporarily saving input/output data by means of a storage device for later use. For example, in words processing the output can be spooled onto a floppy disk and then run off at the same time as the user is editing or otherwise using the microprocessor. *See idle time.*

Spot Punch. A punch which is operated directly by hand. It is capable of making single holes in a *punched card* or *paper tape*. It is also known as unipunch.

Sprocket Holes. 1. Holes which are punched in *paper tape*. Their function was to drive the tape, or more usually to generate a signal used for indexing or timing the tape. 2. Holes at the edges of *continuous stationery*, which are used by a *printer* to drive the stationery.

Sprocket Pulse. In a *paper tape reader*, it refers to the pulse or signal generated by the reading of the *sprocket holes* on paper tape.

SQ. Squeeze (acronym, pronounce letters individually). *See squeezed files.*

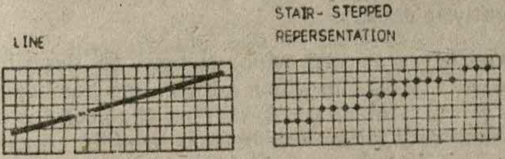
Squeezed Files (SQ). Normal data or program files that have been organized more efficiently using squeeze (SQ) and unsqueeze (USQ) utilities to save space and reduce transfer time.

Stack. A block of successive memory locations which are organized on a last-in-first-out (LIFO) basis to preserve the ordering of information that is necessary to certain functions. *See LIFO.*

Stacker. A receptacle which is used for holding *punched cards* after they have passed through a machine.

Stack Pointer. *See pointer.*

Stair Stepping. Refers to the discontinuous nature of a line which is drawn by a raster display at any angle other than vertical, horizontal, or 45 degrees. The raster display must approximate the line because of the limitations of its technology and resolution.



Stair Stepping

Standard Code Sets. Sets of codes which are defined by national and international standards bodies, such as *ANSI* and *CCITT.*

Standard Interface. A *hardware* system which provides standard logic circuits and *input/output channels* for the connexion of *peripheral units* to a *central processor.*

Standardization. 1. Refers to the process of replacing the *floating point representation* of a number by its *normalized* form. 2. A synonym for *signal standardization.*

Standardize. Means replacing the *floating point representation* of a number by its *normalized* form.

Standard Subroutine. A *subroutine*, designed to carry out a function having application in more than one *program*, which could be incorporated into different programs as needed Standard subroutines are usually supplied by computer manufacturers and may be present on a *library tape.*

Start Bit. A bit whose only function is to indicate the start of a character (1 byte) in an asynchronous transmission of data. *See asynchronous communication.*

STAT. Status (abbreviation).

Statement. Means a *source language instruction.* It is also used for any expression which can be input to a *compiler*, including *narrative* statements and *directives* controlling the operation of the compilation.

Statement Number. A serial number which is assigned to each *statement* in a *program* written in a *source language.*

State-of-the Art. The most current research and up-to-date technology in a specific field of knowledge.

Static Dump. Refers to a *dump* which is performed when a program reaches an *end of run* condition or some other recognizable stage within the *run.*

Staticizer. A *logic element* when is able to convert information from a sequence of signals arriving one after the other in time to a corresponding representation of the information held permanently in *store.*

Static Memory. A term which is used to describe *random access memory* (RAM) in which information has been retained as long as power is maintained, without the need for constant reinsertion of data. Static *memory* has been found to be simpler to use but more expensive, less compact and uses more power than dynamic memory.

Static RAM. A type of memory storage, which will retain its contents indefinitely without refreshing (regeneration) so long as power is supplied. *Contrast with dynamic RAM.*

Static Store. 1. A *store* in which each *location* is having a fixed space, and access to information is not dependent on the location being available at a specific time. 2. A *store* having no moving parts.

Static Subroutine. A *subroutine* which always carries out the same operation *i.e.*, which does not require *parameters* so as to alter its functioning. Contrasted with *dynamic subroutine.*

Static Turtle. In the Logo language, a turtule (cursor) with a fixed spatial position and heading that responds to such commands as FORWARD and LEFT. *See turtle graphics.*

Stationery. Items used in computer systems for recording results produced on a *printer* or *typewriter.*

Statistical Multiplexor. The term used for the version of a *time division multiplexor* which improves efficiency in the use of data circuits by giving increased priority to certain *channels*, in accordance with statistical predictions of likely *loading*.

Status. (STAT). The condition of a device at a specified time.

Status Word. A *word* having information about the condition of a *peripheral unit* This information includes, for instance warning information when a peripheral needs attention (e.g, when the *paper low condition* is present on a *printer*) and gets entered into the status word automatically by hardware.

Step Change. Means a change from one value to another as a single increment taking negligible time.

Step Counter. A *counter* keeping count of the steps in those *instructions* such as division and multiplication which involve a succession of separate operations.

Stepper Motor. An electromechanical device that moves or rotates by a fixed amount each time an electrical pulse is applied to it. Often found in printers, disk drives, and other computer equipment.

Stop Bit. A bit that comes at the end of each character in an asynchronous serial transmission.

Storage. (1) An overall term for a category of devices capable of holding data that may be retrieved at any time once it has been input; (2) The act of putting data into memory or on a recording medium for later retieval.

Storage Allocation. Refers to the process of allocating specific areas of *store* to specific type of *data*. Storge allocation is one of the functions which have to be carried out during preparation of a *program*, and one of the operations undertaken by a *compiler* is to specify the areas allocated to the various types of data.

Storage Capacity. The total amount of data which is stored per unit of media and may be accessed by the system without changing media.

Storage Cell. 1. Refers to the smallest physical element of a *store*, *e.g.*, in a *core storage* a single core. 2. That part of a store which can have a single unit of data, e g., a bit or *characters*.

Storage Compacting. A practice which is adopted on *multiprogramming* computers, in which *memory locations* have been assigned to *programs* so that the largest possible area of contiguous locations remains available for any other programs which are to be run. Thus, if one program is finished the memory areas will be automatically reallocated.

Storage Cycle. In a *cyclic store*, it refers to the interval between the times when any given *location* can be *accessed*.

Storage Density. Refers to the number of units of data which could be stored per unit length or area of the medium, *e.g.*, the number of *bits* per inch which can be stored on *magnetic tape*.

Storage Media. Refers to the type of medium used; for example, disk, cassette tape, hard disk, mag cards, etc.

Storage Tube. A display technology that behaves like a cathode ray tube (CRT) screen, but which has extremely long-persistence phosphors that retain their charge for hours. The picture will remain on the screen for hours rather than for the fraction of a second common to dynamic storage, eliminating the need for refresh or frame buffers. Storage tubes excel in high resolution unmatched by raster systems, although they are not as well suited as raster systems for color graphics or interactive applications.

Store. 1. Refers to any device or medium which can receive information and retain it over a period of time, and permits it to be retrieved and used when required. 2. To place information into a storage device.

Store Cycle Time. The minimum time which is required to retrieve an item of data from *store*.

Stored Program. A *program* which is wholly kept in *store*, and which is capable of being altered in store.

Stored Program Computer. Any computer working wholly or mainly with *instructions* which are held in *store*, and which can themselves be changed and manipulated in the same way as other data. The term computer is now almost universally referring to stored program computer.

Streaming. A technique for rapid recording on a magnetic tape, usually for backing up a Winchester disk system. Streaming eliminates the gaps and short-stops between data blocks often produced by other recording methods, thereby speeding data transfer.

String. An organized and connected set of characters. For example, the word "data" is a string of 4 characters.

String Break. In *sorting*, a string break takes place when there are no more *records* with *keys* higher than the highest key so far written to the current output *string*.

String Length. The number of characters in a string.

String Length. In *sorting*, it refers to the number of *records* in a *string*.

String Manipulation. Refers to the process of manipulating *strings* of *characters* in *store*, treating them as single units of data.

Structured Programming. A methodology used for *programming* which involves a systematic procedure for describing the program's tasks in a series of stages or modules, each described in increasing detail until the final stage of coding gets reached.

Strobe. A hardware control signal for information transfer.

Structured Language. A computer language that fosters structured programming techniques through its use of vocabulary, syntax, and grammar. *See structured programming.*

Structured Programming. A programming methodology which is developed to simplify the design, debugging, testing and documentation functions associated with computer programming. Structured language is best known for its use of modules and its attempt to drastically reduce or eliminate to GOTO branches in computer programming.

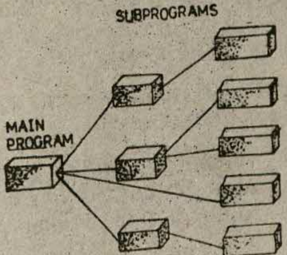
STRUDL. Structural Design Language (acronym, pronounce as one word). A language used for design and analysis of structures.

Stylus. A penlike device used with a graphics tablet for inputting position information relative to a coordinate axes system empoloyed by the tablet.

Stylus Printes. Refers to a *printer* in which each character takes the from of a pattern of dots produced by a stylus or number of styluses moving over the surface of the paper. It is also known as wire printer.

SUB. Subroutine (acronym, pronounce as one word).

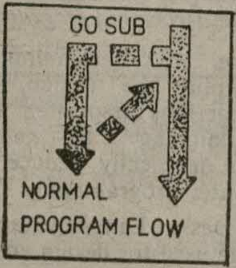
Subprogram. Program segments that carry out a specific function. They are stored in a library and are combined as part of a larger program when needed. If the function is used in many programs, a subprogram offers reduced programming and debugging labor. In contrast to subroutines, which usually are available only to one program, subprograms are available for use by many programs.



Subprogram

Subroutine (SUB). A program module outside the main program that can be called repeatedly by the main program. It can carry out any mathematical or logical routine of which the main routine is capable. Control is transferred from the main program to the subroutine and is returned after the subroutine carries out its function. *Contrast with subprogram.*

Subscript. Characters which are printed below the normal line of type as in Subscript; for example, A_1+B_2.



Subroutine

Subset. Refers to any identifiable group of items which themselves belong to a larger grouping.

Subtracter. A device which carries out the function of subtraction using digital signals.

Suite (of Programs). A number of interrelated *programs* which run one after the other as an operational job.

Summary. A *report* which does not take into account details from each *record* processed but furnishes information derived from such details.

Summary Card. A *punched card* having totals and descriptive data resulting from an associated group of detail cards.

Summary Punch. A *card punch* which is directly under the control of a *tabulator*. It is used for punching *summary cards* from data processed by the tabulator.

Superscript. Characters printed above the normal line of type as in Superscript; for example, x^2+y^4.

Supervisory Control. Refers to a *control system* in which information about the processes under control has been provided at a central location but controlling action is taken by an operator.

Supervisory Program. A master program which is permanently resident in the memory of a computer for controlling *time sharing*, *input/output* and *multiprogramming* functions. Usually regarded as an integral part of the computer and often classified as being part of the *hardware* of the system.

Support. In computer practice, the promise by vendors of help and guidance in using purchased or leased software and hardware.

Surge. Refers to a sudden voltage or current change in an electrical circuit. It can cause a microcomputer and its peripherals to give erroneous results or to stop functioning.

Surge Protector. Refers to a device that plugs into the wall socket to protect microcomputers from alternating current (AC) line surges. The computer plugs into the surge protector. *See surge.*

Surveillance. The term used for the process of monitoring any resource by means of *software*, as part of ensuring *security*.

Switch. To alter the state of a *bit* from 1 to 0 or 0 to 1.3. In *programming*, it refers to a *branch instruction* which selects one of a number of alternative paths; the particular path chosen is known by the setting of the switch.

Switched-Message-Network. The term used for a *data transmission* sytem in which data can be communicated between any users of the network. The telex system is an example of switched-message network.

Switching Centre. In *data transmission*, it is the location where incoming messages get directed to their correct destinations.

Symbolic Address. The form an *address* takes in a *source language*, in which it can be represented by an arbitrary *label* selected by the programmer. The address has been translated into an *absolute address* when the program is *compiled.*

Symbolic Assembly Language Listing. A *printout*, which is produced at the time a *source program* gets *compiled*, which gives the *source language statements* together with the corresponding *machine coding* generated.

Symbolic Assembly System. An automatic programming system which is embodying the use of an *assembly language* and an *assembly routine.*

Symbolic Coding. Writing a program in a *source language.*

Symbolic Debugging. Refers to a method of *debugging* in which certain *source language* statements can be *compiled* together with a *source program* having known errors so as to correct the errors.

Symbolic Instruction. An *instruction* in *source language* form.

Symbolic Language. A set of instructions to the computer that is understandable by humans because of the English-like nature of the language. A symbolic language still must be translated to machine language for execution.

Symbolic Name. A *label* which is used in *programs* and written in a *source language* to reference *data elements, instructions, peripheral units*, etc. Symbolic names often makes use of *mnemonic codes.*

Symbolic Programming. Means writing a program in a *source language.*

Symbol Table. A *table* having *symbols* and their interpretation.

Symmetric difference. Synonymous with *exclusive-or operation.*

Sync Bytes. Refer to the *bytes* or units of information which precede transmission of data in *synchronous working* order to inform the receiving station that a signal is about to be transmitted so that receiver and transmitter may synchronize their respective clocks.

Synchronization. Coordination of signals to insure that receiver and transmitter are operating in phase with one another.

Synchronizer. A *storage device* which is acting as a *buffer* to counteract the effects of transmitting data between devices which operate different rates.

Synchronous Computer. Refers to a computer in which the timing of all operations has been controlled by equally speed signals from a *clock.*

Synchronous Data Communication. Refers to a transmission of data in which transmitting and receiving devices have been synchronized to a common clock signal.

Synchronous Working. Carrying out a sequence of operations under the control of a cycle of equally spaced signals from a *clock.*

Syntax. The set of grammatical rules defining the structure of a programming language.

SYSGEN. System Generation (acronym, pronounce as one word). A process for initializing and generating an operating system in a computer.

System. Means any group of objects which are related or interacting so as to form a unit In *data processing*, the objects interrelated will be individuals and machines, the purpose of their interacting being to achieve certain defined ends concerned with the manipulation of information, *e.g* , to produce a payroll.

Systems Analyst. A person who examines and defines activities, work flow, and problems to be solved, as well as systems and procedures, in order to determine how the necessary operations can best be accomplished. The situation usually is reviewed in terms of a computer environment.

Systems Definition. Refers to the document which is produced by a *systems analyst* and defines in detail the system he has designed. This document explains all clerical procedures and includes *program* specifications.

Systems Design. The term used for the investigation and recording of existing *systems* and the design of new systems.

Systems flowchart. Means a *flowchart* in which the *flowchart symbols* represent specific clerical *data preparation* and computer procedures which have been combined in *system design.*

Systems Network Architecture. A *data network protocol* which was developed by IBM as a standard means of interconnecting *terminals* with *host processors* and permitting the sharing of separate *applications* in the host processor.

Systems Recovery Time. Means the period which is spent on recovery. Also known as *rerun time.*

System Software. Programs that contral the execution of user or applications programs, and which include compilers, assemblers, debuggers, utilities, and operating systems. These are usually supplied by the hardware manufacturer.

T

Tabbing. Sending a printer head or display cursor to a preset column position on the paper or screen.

Table. The term used for an *array* of data in *memory*, or on some other storage medium, which is so organized that individual items could be retrieved by the specifying of *keys* stored as part of each item.

Table Look-at. Refers to the process whereby items in a *table* are obtained by calculation. That is, an *algorithm* is used for locating the position of the item in the table, rather than employ a search as in *table look-up*.

Table Look-up. The process of searching through an array of data (a table) using logic in a computer routine to find a specific value.

Table Look-up. A method of getting a function value from a *function table* corresponding to a specified *argument.*

Table Look-up Instruction. A *basic instruction* which needs to be modified to refer to data arranged in a *table.* An instruction used to search for an item having a nominated *key.*

Tabular Language. Refers to a system for specifying programming requirements in terms of *decision tables,* in which the tables fulfil the role of a *problem-oriented programming language.*

Tabulate. On a *punched card tabulator,* the printing of totals for groups of cards, each line of totals being initiated by a change of *control data* between the end of one group and the beginning of the next.

Tabulation. 1. A printed report which is produced on a *punched card tabulator* having of *totals only.* 2. The automatic movement of the carriage of a typewriter or teleprinter through a series of specified positions in a succession of print lines.

Tabulation Character. A *character* which forms part of some data to be printed but which is not itself printed and instead has been used to control the format of the printed output.

Tabulator. A machine forming the heart of *punched card* systems. It is automatically able to fed punched cards, reading data from them to be directly *listed* and/or accumulated for the printed of totals at the end of certain card *groups.*

Tag. A unit of information having a composition that is different from that of other members of the set so that it can be used as a marker or lable. This unit is assigned a name or a memory location to make it easier to reference.

Tag Converting Unit. A machine which is used for reading *tags* and for transfering the data thus sensed into some other medium like *magnetic disk.* Some tag readers are able to provide for direct input to computer *memory.*

Tag Format. Means the layout and design of a *record* which are used as a *tag* to locate an *overflow bucket.*

Takedown. Refers to the process of removing *magnetic tapes, punched cards, paper tape* and *printouts* from *peripherals* at the end of a computer *run* or suite of runs.

Takedown Time. The time needed to complete a *takedown* operation.

Tally. A printed list of figures obtained on an adding machine.

Tally Reader. A machine that is able to read data as printed characters from a *tally* list; *e.g.,* by using *optical character recognition.*

Tandem System. A system in which two *hardware* units are used for fulfilling some processing operation.

Tape. A continuous strip of material which is used for recording data *e.g.*, *paper tape* or *magnetic tape.*

Tape Alteration. A process which is achieved under *program* control or by operator intervention, in which a program can be made to switch from one *take deck* to another to minimize the time delay in changing from one *reel* to another when processing a *multi-reel file.*

Tape Bootstrap Routine. A *bootstrap* routine which is present in the first *block* of a *program tape.* If the routine is read into *store* it reads specified programs from the tape; it may also have other *utility programs.*

Tape Cartridge. Magnetic tape in a cartridge which is used with a tape drive, usually for the purpose of media back-up for a disk. The data cartridges can be high capacity, holding as much as 20 megabytes of unformatted data, and data can be transferred quickly in a streaming mode.

Tape, Cassette. *See audio cassette tape.*

Tape Comparator. A machine that is automatically able to compare two *paper tapes* which are prepared from identical *source documents.* The tapes are compared *character* by character and the machine stops as soon as a discrepancy is detected.

Tape Controlled Carriage. An *automatic carriage* activated under the control of a loop of paper or mylar plastic into which holes are punched to provide a *program* for automatically feeding the stationery.

Tape Core. A *maganatic core* which is constructed using a length of ferromagnetic tape wound as a spiral.

Tape Deck. A device having a *tape transport mechanism* for handling *magnetic tape*, along with an associated *read head* and *write head.*

Tape Drive. Refers to the *tape transport mechanism* only. Also used for describing the mechanism that feeds *paper tape* in an automatic *paper tape punch* or *paper tape reader.*

Tape Feed. A mechanism which forms part of a *paper tape reader* or *paper tape punch.* That part of the machine which can feed *paper tape* to be read or punched.

Tape File. A series of *records* which are arranged sequentially on *magnetic tape.*

Tape Group. A single unit having two or more *tape decks.*

Tape Lables. Special *records* kept at the beginning and end of a *reel* or *magnetic tape* for providing details about the *file* of *records* stored on the tape.

Tape, Magnetic. *See magnetic tape.*

Tape Mark. A special *character* which is recorded on a *file* of *magnetic tape* so as to subdivide the file into sections. A tape mark is generally followed by a *record* providing descriptive data which is concerned with the particular section of the file.

Tape Plotting Systems. A system which is used for driving a *digital incremental plotter* from data recorded on *magnetic tape* or *paper tape.*

Tape Processing Simultaneity. A *time sharing system* in which several *magnetic tape decks* are activated to *read* or *write* cata at the same time while continuing to process data in the *central processor.*

Tape Punch. Refers to a device for punching holes in *paper tape*, the term was generally used for denoting a *keyboard* operated unit.

Tape Reader. A device which is able to read *data* recorded as holes punched in *paper tape.*

Tape Reel. A magnetic tape which is wound around a spool and referred to collectively as a tape reel These units are generally used with industry standard magnetic tape storage systems.

Tape Reproducer. A device which is used to copy data from one length of *paper tape* to another.

Tape Serial Number An identification number which is usually recorded on a tape *healder label.* It is allotted to a new *magnatic tape* and remains unchanged through the life of the tape even though all other identifying information (*e.g., file name, reel number*) may alter.

Tape Sort. The term used for a computer operation in which a *file* of data held on *magnatic tape* is sorted into sequence in accordance to a *key* contained in each *record* of the file.

Tape Thickness. Refers to the least of the cross-sectional dimensions of a piece of *paper tape* or *magnetic tape.*

Tape Transport 1. The mechanism that is able to drive a *reel* of *magnetic tape* past the *read* and *write* heads on a *tape deck.* Also known as magnetic tape drive. 2. A machanism which is used for driving *paper tape* through a *punching station* or *sensing station.*

Tape Transport Mechanism. Part of a *magnetic tape deck*; the mechanism that is able to drive and control the movement of *magnetic tape* past a *read* or *write* head.

Tape Unit. Usually the term used for a single *magnetic tape deck* and its associated control circuitry. However, it is used as a synonym for *magnetic tape group* to mean two or more tape decks housed in a single cabinet.

Tape Verfier. A drvice which is used for checking the accuracy of data punched into *paper tape*.

Tape Width. A piece of *paper tape* or *magnatic tape* is having two cross-sectional dimensions: the greater of these is known as the tape width (the other being the *tape thickness*).

Tape Wound Core. A *magnetic core* which is made from a coil of ferromagnetic tape.

Tapped Potentiometer Function Generator. A device which is used on *anolong computers* for producing functions of one variable, in which the input variabl sets the angular position of a potentiometer shaft. A number of taps along the potentiometer have been positioned to represent the table of values for the function.

Target Computer. The specification of the particular system which is needed for running a particular *object program.* It is also known as target machine.

Target Configuration. Same as *target computer.* However, it refers to particular combination of *peripheral units* and the number of *memory locations* which are needed to run a particular *object program*

Target Phase. During *compilation*, the phase at which the *object program* is first run.

Tariff. The charging scheme which is applied by *network* operators (usually national *PTT*s), covering both data and voice transmission, and *packet switch* charges.

Telecommunication The transmission of information through phone lines, cables, optical fibres, TV, FM radio waves, satellite transmission, etc.

Teleconference. Refers to the interconnexion of a number of end users through a telephone and/or *data network*, so that information cauld be shared in *real time*.

Telemeter. Equipment which is used for recording and transmitting measurements as data to a distant location by electromagnetic waves.

Telemetering. Refers to the recording and transmitting of measurements and data by electromagnetic means and the reception of such data at a distant point

Telephone Data Set. A unit which is used to connect a *data terminal* to a telephone circuit, *e.g.*, to transmit data from the terminal to a processing centre. A telephone data set is able to convert signals from the terminal into a form suitable for transmission over a telephone circuit, and vice versa.

Telephonic Communication. In relation to *electronic data processing* this form of communication allows data to be transmitted at very high speed and by the use of *multiplexing* techniques several signals can be transmitted over a single channel.

Teleprinter. Any device employing a keyboard integrated with a printer and used for telecommunications.

Teleprinter. A device which resemples a typewriter and can be connected to a *communications link* for receiving or transmitting data from and to a distant point. Incoming signal are received on a print unit forming part of the teleprinter, and on some machine the incoming signals are also automatically recorded on *paper tape*. Outgoing messages are to be entered on a *keyboard* and, on some teleprinters, may be transmitted automatically by the passing of a message tape through a paper tape reading unit. Teleprinters have been sometimes used for direct *input/output* to a *central processor*.

Teleprocessing. A term used for describing systems in which remote locations have been connected to a central computer by *data transimission* circuits.

Teleprocessing Monitor. A *software package* providing a set of facilities. It is designed to assist the development and operation of complex *on-line* and *real time applications*. The teleprocessing monitor (TPM) refers as an *interface* between user application and the *operating system* of the computer.

Telesoftware. Refers to the transmission of *software* from a central *store* or data base to a local *processor* over a *telecommunication network e.g.*, the telephone system.

Teletext. An advanced form of *telex* service. It interconnets *terminals* ,providing *word-processing* facilities, like use of upper and lower case characters, and *text editing* commands.

Teletext. A method which is used for communicating information by using television signals. A normal TV picture is having a number of lines; some of these lines are not used for conveying picture data, and the signal capacity of these lines has been used to carry codes which could be decoded by a simple adaptor to the TV set and displayed on the screen instead of, or superimposed over, the TV image.

Teletext Decoder. A device which is able to detect *teletext* signals on a TV broadcast and convert them into a text and graphics image that could be displayed on the television screen.

Teletext Editing Terminal. Refers to a device for creating the text and graphics codes for a teletext transmission.

Teletext Standards. Refer to the published *character codes* and *transimission* standards for a *teletext* system. The British *Ceefax* and *Oracle* teletext services use un *alphamosaic* standard.

Teletype^{TM}. Trademark of the Teletype Corporation. One of the first peripheral devices used for sending and receiving messages with a computer. A Teletype has been characterized by high reliability, noisy operation, and low cost. It also has relatively slow printing speeds of about 10 characters per second and slow transmission rates of 110 baud.

Telytype Grade. A grade of circuit which is suitable for the transmission of signals for *telegrophic communication.*

Teletype Input/output Unit. A telegraphic terminal device which is specifically used for connexion to a central; *e.g.*, a *teleprinter* used as an *input/output* unit.

Teletypewriter. A telegraphic terminal device, which resembles a typewriter. It is used to transmit and receive messages in a telegraphic communications system.

Telex^{TM}. An international network of teleprinter subscribers.

Telewriting. The term used for the use of computer *graphics* techniques which are able to transmit handwriting and drawings in *real time* between communicating *terminals,* if the writing is created by use of a *light pen* or *graphics pad.*

Telex. An automatic exchange service which is provided for communication between subscribers using telegraphic equipment like *teleprinters.*

Template. A specification of a structure which permits programmes to declare their own data types.

Temporary Storage *Storage locations* which are reserved, during the operation of a particular *program* for storing *intermediate results.*

Tera. Prefiix which denotes one million million or 10^{12}.

Terminal. Means a device at which *data* may be input to or output from a *data communications* system. *Visual display units* are often known as terminals. It is also known as *data terminal.*

Terminal Symbol. A symbol on punched *paper tape* which indicates end of a *record* or some other unit of information.

Terminal User. A person who is using a *terminal.* He is also known as transactor.

Ternary Incremental Representation. Related to *digital integrators*; a method of *incremental representation* in which increment values have been rounded off as either $+1$, -1 or zero.

Test. To examine an element of data or an *indicator* for ascertaining whether some predetermined condition has been satisfied.

Testbed. A *software* system which has been designed to simplify the testing of *programs* by providing *test data* and diagnostic information.

Test Data. Sample data, which covers as many likely and unlikely combinations as reasonable and is prepared as input to test a *program.* Expected results are also prepared and compared with the results produced by the computer.

Testing Envelope *Software* providing an environment for the testing of a *program* or a *program module.*

Test Pack. A *pack* of *punched cards* having both *program* and *test data* for a *test run.*

Test Program. A *program* which has been designed to check the correct functioning of the *hardware* units of a computer. It is also able to identify particular kinds of fault.

Test Run. A test, carried out to check that a particular *program* is operating correctly, in which *test data* has been used to generate results for comparison with expected answers.

Text. Means the information element of any message, excluding those *characters* or *bits* needed to facilitate the transmission of the message.

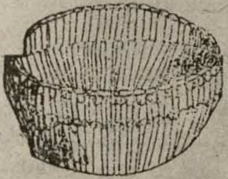
Text Editing. Facilities provided in a *word processing* system which permit the user to insert and delete words and lines, and manipulate complete sections of text by altering their location within a document.

Text Editor. A progrom or set of routines in a computer system, most often used by programmers to edit a source program. It allows the user to enter, change, order, output, or delete information.

Thermal Printer. A small-format, non-impact printer which forms characters by applying heat to special heat-sensitive papers. Thermal printers have slow speeds, mediocre quality reproduction, and expensive paper overhead. However, they have low initial costs and are able to easily combine graphic and alphanumeric output.

Thimble Print Element. A plastic thimble-shaped element having flat spokes with raised characters. The thimble rotates, positioning the spokes so that the striking device can hit the spoke tip against the ribbon; this action imprints the character onto the paper.

Thin-Film Memory. An *internal storage* medium which consists of a thin layer (a few millionths of an inch thick) of magnetic substance deposited on a plate of non-magnetizable material such as glass. The film can be polarized for the representation of *digital* information, helping data to be written or retrieved at speeds measured in *nanoseconds*. This type of *memory* is having the characteristics which are necessary for miniaturized components and can operate at very fast processing speeds.



Thimble Print Elements

Third Generation Computers. Machines which are built with *integrated circuits*. Related to *first generations, second generation* and *fourth generation*.

Third Party Lease. An arrangement by which an independent firm buys equipment from the manufacture and in turn leases it to the end user. The middleman firm is called the "third party."

Third Party Maintenance. Means the maintenance of computer equipment by specialist organizations as an alternative to having a maintenance contract with the equipment manufacturer.

Thrashing. An error condition which is taking place with *virtual storage* systems, where the *processor* time is completely occupied with *paging task* to the exclusion of any processing.

Thread. A group of *beads*.

Three Address Instruction. An *instruction* in which three *addresses* have been specified as part of the *instruction format*. When arithmetic operations are carried out, one *location* will be used to contain the *result*, the other two having *operands* to be used in the process.

Three-Dimensional Digitizer. *See digitizer, three-dimensional.*

Three-Input Adder. A *logic element* employed for carrying out *addition* using *digital* input signals. It is accepting three input signals (representing digits of *addend*, *augend* and *carry*) and will be producing two output signals, representing a *carry digit* and a digit for the *sum*.

Three Input Subtracter. A *logic element* which is used for performing subtraction with *digital signals*. It is accepting three input singals (*minuend*, *subtrahend* and *borrow*) and will be producing two output signals representing a digit to be borrowed in the next *digit position* and a digit for the *difference*.

Threshold Element. Means a *logic element* which has one output signal but several input signals, each given a specified weight. The output signal depends on the input signals being greater or less than some given value, known as the *thershold.*

Throughput. Refers to the productivity of a machine, system or procedure, which is measured in some terms meaningful to the process under consideration.

Tie-Line. A leased communications channel which is operating between two private branch exchanges.

Tightly Coupled Twin. One of two *processors* which using are separate *operating systems* but able to share *data* and *code* via an inter-processor *buffer* and to control access to *backing store* without mutual interference.

Time-Derived Channel. A channel which is obtained by *multiplexing* several signals over a single channel, in such a way that each signal has been separated from any other by time.

Time-Division Multiplexing. A system in which a channel is available to a number of terminal devices each occupying the channel for the transmission of *data* for short periods at regular intervals. The effect is such that all terminals are appearing to transmit simultaneously over one channel.

Time Division Multiplier. An *analog* unit which is used for multiplication, in which there occur two input variables and a single output. One input variable controls the the amplitude of a square wave, while the other variable controls the *mark-to-space ratio* of the wave form. The output voltage has been smoothed to derive the average value of the output as a produt.

Time-of Day Clock. An electronic device which is able to register the time in hours, minutes and seconds over a 24 hour cycle. It will be able to transmit a signal to the *central processor* on request so that events can be logged.

Time Origin. A reference point during the generation of a pulse, *i.e*., refers to the point at which the pulse reaches a certain percentage, usually ten per cent. of its full amplitude. All subsequent events related to that pulse have been measured over time with respect to the time origin.

Timer. An automatic timing device providing clock signals withing a *central processor*, for example, to register *elapsed time* for an event in millisecond increments.

Timer Clock. An electronic device which is used for timing events that take place during the operation of a computer system. It is situated in the *central processor*, and can provide data for charging out computer time, monitor operations to detect looping and similar error conditions and provide time in hours and minutes for maintaining an operating log.

Time Scale (Factor). Refers to the ratio between the time for an event as simulated with an *analog device* and the actual duration of time for the event in the physical system under study.

Time Series. Data which is transmited as a series of discrete elements distributed over time. Quantiative values are assigned to specific instants in the time series.

Time Shared Input/Output System. Refers to a computer system in which independent *peripheral units* are activated simultaneously under control of the *central processor* which shares its time in accepting or transmitting data to the peripheral units. At the same time the central processor may be continuing to process data internally by *time sharing* one or more *programs*.

Time Sharing (T/S). An installation in which a central processing system, usually a mini or mainframe computer, serves more than one user, either locally or by telecommunications.

Time Sharing Dynamic Allocator. An *executive program* which is able to control the activation of independent programs in a *multiprogramming* or *time sharing* system.

Time Sharing Monitor System. An *executive program* having a number of routines which coordinate the operation of a *time sharing* computer, including the automatic switching from one program to another in a *multiprogramming* system and the control of all input/output operations so that several *peripheral units* may be operated concurrently while data has been processed in the *central processor*.

Timing Eror. An error made in designing a *progrm.*

TLU. Abbreviation of *table look-up*.

Toggle. A circuit or device which must always assume one of two stable states.

Toggle Switch. A manually operated switch which could be set to either of two possitions.

Token. May be used to refer to the code word for a macro instruction.

Top-of Form's Set. Refers to a forms handling ability that can advance paper automatically to a present position, and which gets initiated by receipt of a form feed character. This can be carried out by hardware or software.

Torn-Tape. *Paper tape* torn from a *paper tape punch* on receipt at a *switching centre* in order that it could be taken to a transmitting *paper tape reader*.

Torsional Mode Delay Line Refers to a *delay line* in which mechanical vibrations have been propagated by subjecting a material to torsion, with the object of introducing a specific delay in the transmission of a signal.

Total System. A complete system of clerical and computer procedures which embraces all the main activities of a particular company or organization.

Total Time. The total time which is available for utilization of a particular computer installation, including all *attended time* and *unattended time*.

Total Transfer. A method which is used for accumulating minor, intermediate and mojor *control totals* (*control data*) when printed results are prepared on a *punchad card* tabulator. The minor total was accumulated directly from a card *field* and higher levels of totals were created by accumulated directly from a card *field* and higher levels of totals were created by accumulating from minor to intermediate, and from intermediate to major totals.

Touch Sensitive Screen. Refers to a visual display unit superimposed over the screen surface a device (usually consisting of a pattern of infrared light sensors) which is able to detect the location on the screen of a touch, and can cause software to be activated according to the location 'touched', *e.g.*, for *menu selection*.

Touch Terminal. A terminal with which the user physically interacts by touching the screen with a finger in order to choose on input, instead of using traditional input devices such as keyboards, digitizers, or light pens.

Tpi. Tracks per inch (acronym, pronounce letters individually).

Trace. Refers to a listing of all the steps that have taken place during a software procedure. The purpose is to help locate sources of logic error.

Trackball. A device which is used mainly to enter data resulting from the movement of a ball, which is set in a small box so that it rotates freely. The ball has been manipulated by hand, and the corresponding positions are displayed on the screen.

Trace Program. A *diagnostic program* which is used to check and locate errors in other programs. The output from the trace program may be having selected *instructions* from the program being checked, as well as results obtained during the operation of the instructions.

Trace Statement. A statement which is available as part of the *source coding* for certain *progamming languages* thereby enabling specified *segments* of a *source program* to be checked at the *source language* level.

Track. 1. A channel on a *magnetic memory* device which is used for recording data, *e.g*, the tracks on a *magnetic disk*. 2. One of the longitudinal channels for recording data as holes punched in *paper tape*, *e.g.*, 6 track tape.

Trackball. A palm-sized ball which is mounted so that it can spin freely. It is used to control the movement of a *cursor* on a *visual display unit*.

Track Labels. Special *records* which are used to identify *tracks* on a *magnetic storage* medium; *e.g.*, on a *magnetic card file* a card/track number might be used as a label at the beginning of each track of each card.

Track Pitch. The physical measurement which separates two adjacent *tracks*; *e.g.*, on *paper tape* or *magnetic tape*.

Tracks. A physical organization in the form of concentric rings, which is used to store data on a magnetic disk. The arrangement has been found to be somewhat similar to that of a phonograph record. However, any location on a track could be accessed directly, without a sequential search. Each track has been divided into sectors. *See sectors.*

Tracks Per Inch. (Tpi). A unit of measurement for track density on a floppy disk.

Tractor Feed. A printer attachment which guides paper using advancing sprockets, or pins, that fit into holes in the paper. The method provides more precise alignment than friction feed methods. It is same as pin feed.

Trailer Label. A special *record* which appears at the end of a *file* stored on *magnetic tape* or other magnetic recording medium. It is useful to identify the end of the file and usually provids certain *control data* related to that file, *e.g.*, number of records.

Trailer Record. A *record* immediately following an associated group of records, and having totals and other *control data* relevant to the group.

Trailing Edge. Refers to a *punched card*—the edge which last enters the *card track* of a punched card machine.

Trailing End Relating to *paper tape*, it refers to the logical end of a length of tape, *i.e.*, the end at which the last *record* is occurring for that particular batch.

Transacter. Refers to a device which can be linked to a computer system to allow a number of data sources to be coupled with the system.

Transaction. 1. Any event which needs a *record* to be generated for processing in a data processing system. Also refers to the record itself. 2. Refers to a set of exchanges between a *terminal user* and a computer system, including the processing of these exchanges which may also involve the *updating* of *files.*

Transaction Data. Refers to a collection of *characters* or *digits,* which represents or more events, and need to be accepted into a data processing system to *update* a *master file* or to generate results.

Transaction Listing. (1) A record of everything that has happened on a system. Same as system log; (2) A listing of all transactions processed in a user program. Same as audit trail.

Transaction Log. A physical record which is maintained on *backing store* of every *transaction* occurring in a *real time* based system.

Transaction Processing. Refers to the activation of a *central processor* by messages from remote locations, and its response to those locations.

Transaction Record. Synonymous with *change record.*

Transaction Tape. A *magnetic tape* or length of *paper tape* having a *transaction file.*

Transceiver. A device or circuit which is capable of both receiving and transmitting.

Transcribe. Means to copy from one medium to another, *e.g* , from *punched card* to *paper tape*, or from *paper tape* to *magnetic tape.* This type of operation can be carried out by special *off-line* equipment or by a computer *progrm.*

Transcriber. A device which is used to transfer information from one medium to another, *e.g.*, from *paper tape* to *punched cards.*

Transducer. A device that is able to convert energy from one form to another. For example, in an *acoustic delay line* electrical energy has been converted to sound energy.

Transfer. 1. An operation to copy data from one part of *memory* to another. It is effected by a *program instruction* which specifies the memory *locations* required. 2. Refers to *transfer control* from one part of a *routine* to another, or to transfer control from one routine to another, by means of a *branch instruction.*

Transfer Card. If a *program* is located into a computer by means of *punched cards*, a transfer card executes the entrance into the program after loading.

Transfer Check. A *parity check* which is carried out to verify the accuracy of a *transfer operation.*

Transfer Control. A *branch instruction* is considered to transfer control from one part of a *program* to another part, *i e.*, the *program controller* jumps from one set of instruction to another.

Transfer Instruction. 1. An *instruction* which is able to copy data from one part of *memory* to another. 2. A *branch instruction* which permits *transfer control* from one part of a *program* to another.

Transfer Interpreter. Refers to a *punched card interpreter* which is able to read information from a *punched card* and printed the information on to the same card or on to a following card. It is also known as posting interpreter.

Transfer Operation. An operation in which data has been moved from one area of *memory* to another, or from one medium of *store* to another.

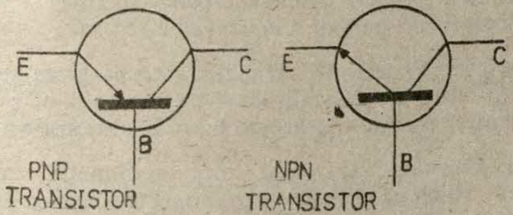
Transfer Rate. Refers to the rate at which data is transferred between a *peripheral unit* and the *main memory* of a computer.

Transfluxor. Refers to a type of magnetic storage element, in which a small piece of perforated ferromagnetic material is employed which provides a *non-volatile memory*.

Transform. Refers to convert data to another form without changeing the information content, *e g.*, to *normalize* a *floating point number*.

Transient. Fast, temporary variations in a line voltage.

Transistor. An electronic device which uses semiconductor properties to control the flow of current.



Transistor, Schematic Representation

Transistor-Transistor Logic. A common form of *integrated circuit* design which is flexible but has some disadvantages, including high power dissipation and inadequate speed for some applications.

Transition. 1. Refers to a change in a circuit from one operating condition to another. 2. It is also known as *bridging*.

Translation. In computer graphics, it refers to the displacement of a computer-modeled object when it is moved along a set of coordinate axes.

Translator. A program that is able to convert a sequence of statements in one language into corresponding statements in another language. Interpreters, assemblers, and compilers are types of translators.

Transmission Speed. Refers to the speed at which data gets transmitted over a communication line, expressed in bits per second (bps). For most consumer needs, the bit rate is roughly equal to the baud rate.

Transparent. Changes or operations in the computer program or system are said to be transparent when they are not noticeable by the user, but are necessary to carry out instruction commands or functions. For example, a change that speeds up a processing function but does not change a user's interaction with the program would be transparent. The term can pertain to hardware or software changes.

Tree. A type of *decoder* in which the graphical representation of the input and output lines is resembling a tree.

Tree Network. *Network architecture.*

Tree Structure. A hierarchical method of indicating data relationships, tree structures promote efficient search and retrieval of data. In "travelling down the logic tree," the user makes a series of binary choices that exclude unwanted possibilities until the object of the search is isolated. In most cases the tree structure can only be entered from the top, which corresponds to the most general level. The logic can be considered in terms of the old game "20 Questions," which moves from general to increasingly specific queries.

Traid. Refers to a group of three *characters* or three *bits*; a unit of data which forms part of a *message* or *record.*

Trigger. To trigger, to activate a machine or a *program* automatically; *e.g.*, to *branch* automatically to the *entry point* of a program in *memory* after *loading* the program. It is also known as initiate.

Triple Length Working. Carrying out arithmetic operations on numbers which need three *words* so as to develop the necessary precision for the *result*.

Trouble Shooting. Searching for errors in a *program* or for the cause of some machine failure. Identifying and eliminating errors in a *routine*. It is known as *debugging*.

TRS. Trandy Radio Shack (acronym, pronounce letters individually).

True-Time Operation An *analog* system operating coincidentally with the physical system being simulated.

Truncate. To suppress those digits of a number which are not significant according to some predetermined requirement for accuracy in a result.

Truncation. The process of dropping the least significant digits of a number (example, in 2.9783, dropping the .0083 to produce 2.97). The resulting loss of precision is usually in favor of greater speed or simplified handling, due to a reduction in storage requirements. Since only a certain number of digits can be fit into a computer word, the amount of truncation required depends upon the machine's word size. The larger the word size, the less truncation is required and the greater the accuracy. *See word size.*

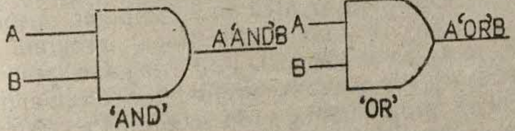
Truncation Error. An error which arises from inaccuracy in truncating a result.

Trunk. Sometimes it is used to describe an *interface* channel between a *preipheral unit* and a *central processor.*

Trunk Circuit. A channel which connects two telephone or telegraph switching centres.

Trunk Link. An interface allowing *peripheral units* to *access* the *main store.*

Truth Table. A mathematical table that states input values and lists all possible combinations (Boolean relationships) of output values as a function of the input. *See Boolean Algebra, AND, OR, NOR.*



A	B	A'AND'B
0	0	0
1	0	0
0	1	0
1	1	1

A	B	A'OR'B
0	0	0
1	0	1
0	1	1
1	1	1

Truth Tables

T/S. Time Sharing (acronym, pronounce letters individually).

TSS. Time Sharing System (acronym, pronounce letters individually).

T Switch. A device that allows two peripherals to share a common third component or input/output port.

TTY. Tele Typewriter (acronym, pronounce letters individually). Also teletype machine.

Turn Around Document. A document which is produced as output from a computer system and circulated to initiate some clerical transaction external to the computer procedures and then re-input to the system to *up date* computer *files*. Such documents are often found in systems that use *optical character recognition* for data input. Documents printed by the computer are circulated, other data is then added and an OCR reader accepts data from the document into the computer once more

Turnaround Time. A measure of system performance based on the elapsed time from the submission of a job until the receipt of some form of output.

Turnkey. A system or installation that is complete and ready to run without further additions or modifications.

Turnkey Operation. Means the supply by a contractor, of a complete computing operation, including *hardware*, *software* and computer staff for a user organization.

Turtle. The name for a small traingular pointer on a display screen, which is used with the Logo language to implement turtle graphics. *See trutle graphics.*

Turtle Geometry. A new mathematics based on turtle movements in the Logo Language.

Turtle Graphics. Drawings created on a computer display or output device using the Logo educational program. Commands are sent to a turtle (cursor). Following the specific Logo commands, the turtle can move around the screen and draw lines. Concepts of programming and coordinate systems can be taught to children (and adults) using this approach.

Tutorial. Lessons, classes, demonstrations covering a subject area; (2) Instructions about running hardware and/or software, usually in manual or program form.

Twelve Punch. A term which was once used to denote a hole in the topmost *punching position* of a *card column*. It is also commonly known as the 10 or Y-position.

Twenty-Nine Feature. A device which is used on *punched card* machines to enable values up to a maximum of 29 to be recorded in a single *card column*, the *punching positions* 11 and 10 being used to represent 10 and 20.

Twin Check. Any checking method in which an operation is carried out twice; *e.g.*, to *read* data twice and perform an automatic comparison.

Two Address Instruction. Refers to an *instruction* in which the *addresses* of two *operands* have been specified as part of the *instruction format.* When arithmetic operations are to be performed one of the *locations* addressed will be used to hold the *results* after the instruction has been executed.

Two-Core-Per Bit Store. Descriptive of a *memory* in which each *binary digit* has been represented by two *magnetic cores.*

Two Dimensional Storage. Pertaining to *direct access* devices; in which an area allocated to a particular *file* need not be a series of physically contiguous *locations* but instead will be specified as a number of *buckets* drawn from one or more *seek areas.*

Two input adder A *logic element* which carries out *addition* by accepting two digital input signals (a digit of a number and an *added* or a *carry*) and which provides two output signals (a carry digit and a digit for the sum).

Two Input Subtracter. A *logic element* which it used to effect the operation of *subtraction.* It is accepting two input signals (a digit of a number, and a *borrow* digit or one representing the *subtrahend*) and is producing two digital outputs, a borrow digit and one for the *difference.*

Two-Level Subroutine. A *subroutine* having another subroutine within its own structure.

Two Out of Five Code. Refers to a code system in which *characters* or *digits* have been represented by groups of five *binary digits,* any two of which may be set to 'one' while the other three are 'zero'.

Two-Plus-One Address. Refers to an *instruction format* in which two *addresses* are used to specify separate *operands,* while a third address is used to indicate the *location* for the *result.*

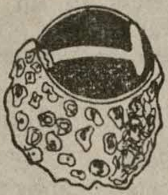
Twos Complement. A *radix complement* for the *binary notation* system.

Two State Variable. A variable that can be a value from a set having two elements only.

Two-Wire Channel. A circuit which can either transmit or receive along two paths.

TWX. A communications system which provides two-way transmission for telegraphic communication over the switched telephone network.

Typeball. A molded metal printer element shaped like a golfball, with raised characters set around the surface. It is mounted on a movable axis and acts as a hammer, striking the ribbon against the paper to produce the characters image.



Typeball

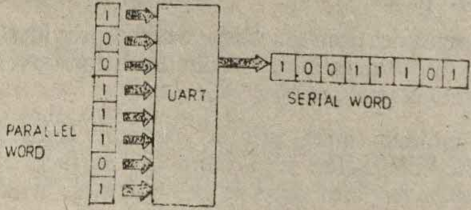
Type Bar. A *print member* which is embossed with a range of *characters* or *symbols, e.g*, forming part of the *print unit* for a *punched card tabulator.*

Type Drum. A barrel-shaped drum which is used on a *line printer* and having a number of *print positions* each consisting of a band of about fifty characters embossed around the drum's circumference. A typical drum might be having 160 print positions.

Type Face. The design of the characters printed by a particular *printer.*

U

UART. Universal Asynchronous Receiver/Transmitter (acronym, pronounce first letter individually, rest as on word). A large scale integration logic circuit that is able to convert parallel input from the computer into asynchoronous serial data for transmission. In the other direction (for a received transmission) UART is able to translate received asynchronous serial data into parallel bits for use by the computer. It is normally used to connect a parallel port to a serial communication network.



UART

UCSD Pascal. University of California, San Diego Pascal (acronym, pronounce letters individually). A version of the Pascal language which was developed at that University.

UCSD p-System. An operating system for small computers which was developed at the University of California, San Diego.

UG. User Group (acronym, pronounce letters individually).

UHF. Ultra High Fequencies (acronym, pronounce letters individually).

Ultra High Frequency. The terms used for radio waves in the range from 300MHz to 3GHz; used primaily for television broadcasts.

Ultrasonics. Supersonics : the study of pressure waves having frequencies above the audible limit (20 kilocycles per second), but which are of the same nature as sound wa.es.

Ultraviolet Erasing. Use of a high-intesity shortwave ultraviolet light to erase the contents of an EPROM chip.

Unattended Time. Refers to the time when a computer has been switched off but not subjected to maintenance work.

Uncommitted Logic Array. A form of *integrated circuit* having a number of logic components whose interconnexions, and hence function, could not be defined at the time of manufacture, but may be specified at a second processing stage.

Unconditional Branch. An instruction used to transfer control to another part of the program regardless of the results of previous instructions.

Unconditional Branch Insitruction. A *branch instruction* which makes the control to be transferred to another part of a *program*. This transfer does not depend any previous conditions or states of the program. It is also known as conditional jump instruction and unconditional transfer instruction.

Underflow. Refers to the generation of a result whose value is too small for the range of the number representation being used.

Underpunch. Refers to a hole punched in any of the *rows* in a *punched card* except those that were used for *zone* punching That is a hole punched in the lower nine rows of an 80-column card of twelve rows while the top three rows had zone significance.

Undisturbed One Output Signal. Refers to the output from a *store* which has been previously set to one when it has been subjected to a full *read* pulse.

Undisturbed Output Signal. Refers to the output from a *store*-previously set to one or zero-when it is subjected to a full read pulse with no intervening partial pulses.

Undisturbed Zero Output Signal. Refers to the output from a *store* previously set to *zero* if it is subjected to a full read pulse.

Unexpected Halt. Refers to a *halt* in a *program* not due to an *interrupt* or *halt instruction.*

Union Catalogue Refers to a compilation of the listings of two or more catalogues (of libraries for example).

Unipolar. An input signal may be defined as unipolar if the same electrical voltage polarity has been used to represent different logical states.

Uniterm System. Refers to an *information retrieval* system which makes use of cards distinguished from each other by a word, symbol or number which is unique and in some way is describing the content of the card. The descriptors used have been often designed on a coordinate indexing basis.

Unit Record Means a storage medium, *e g.*, a *punched card*, having one complete *record* formed of several *data elements.* For example all data relevant to one staff number are present in one punched card.

Unit String. A *string* with only one member.

UNIXTM. An operating system which was developed by Bell Laboratories for minicomputers, which is now being rewritten for microcomputer systems.

Unpack. Means recovering of original data from a storage location in which it is packed along with other data.

Unpaged Segment. A *segment* not divided into *pages.* It is thus transferred as a complete unit between *main store* and *virtual store.*

Unplot. A *command* causing the pen on a *graph plotter* to be raised from the paper, and thereby stopping drawing.

Unused Time. Refers to the time during which equipment has been switching off and unattended.

Undate. To apply *transactions* to a data *file* so as to amend, and or delete records and thus ensure that the file reflects the latest situation.

Upper Curtate. Those *punching position* to a *punched card* which were having *zone* significance and usually grouped at the top of a card. Contrasted with *lower curtate.*

USART. Universal Synchronous/Asynchronous Receiver/Transmitter (acronym, pronounce first letter individually, rest as one word). A peripheral device that is able to convert parallel data from the central processing unit (CPU) into a serial stream of data for transmission. At the same time it is able to receive and convert serial data into parallel bits for use by the computer. USART is different from UART and USRT in that it can communicate by means of both synchronous and asynchronous techniques.

User Definable Keys. Special keys on the keyboard that initiate certain operations in the program; the keys' functions can be defined by the user.

User Defined Character. Refers to a *character* in a *code set*, where the relationship between the code representation of this character and the symbal actually displayed or printed has been determined by the user through interaction with *software*.

User Defined Function Key. A *function key* whose function is selected by a choice made by a user. It is related to *soft key*.

User Friendly. Refers to software and hardware systems which are supposedly easy for a user to learn to operate without requiring a great deal of specialized knowledge or training.

User Group. (UG). People who share information for the use of a specific computer system, or software, through meetings and/or publications.

User Hook. A facility which is provided by suppliers of *software* enabling users to alter, replace or bypass parts of the software.

User Hotline. Refers to direct telephone access to a manufacturer, who provides end users with answers to technical qustions concerning their products.

User Interaction. Refers to active communication between the computer system and the user. A user entry will make a direct respose by the system. Also known as interactive systems.

User Memory. Central processing unit (CPU) memory which is able to be accessed and changed by the user. It usually refers to the portion of random access memory which is used by application programs.

User Node. Refers to a *node* in a *network* at which a user *terminal* has been stationed.

User Port. A *port* to which a user gets connected to a computer in a *communications network*.

USRT. Universal Synchronous Receiver/Transmitter (acronym, pronounce first letter individually, rest as one word). A high speed transmission converter, which is different from UART in that it is a synchronous device. If the computer sends a message through USRT for transmission, the parallel bits get converted to a serial stream. If receiving serial bits, USRT is able to convert the serial data into parallel words. As it is a synchronous device, USRT depends upon a timing system rather than upon the start and stop bits used in UART. *See UART.*

Utility Functions. Refers to the functions that are used to perform common system procedures, like printing, moving data, reading from disk, etc.

Utility Routines. A group of system programs which are usually supplied by the hardware or operating system vendor. Their purpose is to carry out specific, vital functions which are necessary to the operation of a computer system. These "housekeeping" functions keep the system running smoothly, and include (but are not limited to) : copying programs, recordering programs, listings of operations, etc.

V

V. 22, V. 23, V. 24. Refer to the examples of *V-Series* standards : (*i*) V. 22 acts as a standard for *modems* which are operating at 1200 *bits* per second (bps) in full *duplex* over the standard telephone network. (*ii*) V. 23 is as for V. 22 but for a modem which is operating at a split speed of 600 bps receive and 1200 bps transmit speed. (*iii*) V. 24 is a comprehensive standard for the connexion of data terminal equipment and modems which are covering the definition of some 40 control circuit.

Validity Check. A check which is done to ensure that data fails within certain prescribed limits.

Variable. A symbol which is used in a program to represent a quantity with a value that can be reassigned during the course of program execution.

Variable Block. Refers to a *block* whose size is not fixed but varies (within certain limits) in accordance to the data requirements.

Variable Connector. Refers to *connector* which could be connected to more than one point in a *flowchart* depending on the path taken from a *decision box.*

Variable Field. A field whose length may vary within certain prescribed limits in accordance to the requirements of data. The end of the field is indicated by a *terminal symbol.*

Variable Length Record File. Refers to a file that has records of varying length. *Contrast with fixed length record file.*

VDU. Abbreviation of *visual display unit.*

Vector. In *graphics software*, it refers to *parameters* which reveal the direction and distance of one point from another.

Vectored Interrupt. Refers to a technique in which each interrupting device gives an address at the time of the interrupt request, enabling the operating system to branch to the appropriate interrupt routine. This causes increased efficiency in determining which device is requesting attention, as compared to use of a polling technique.

Vector Mode Display. A method which is used for presenting data on a *cathode ray tube visual display unit* in which vectors have been displayed as straight lines between points on the screen.

Verification. Means the process of checking the original puching of data into *punched card* or *paper tape.*

Verifier. Refers to a *keyboard* operated device which is used to check the original punching of data in *punched cards* or *paper tape.*

Version Number. *Programs* and *packages* are being revised rapidly and in order to keep control over different versions of the same piece of software, version numbers have been assigned to each successive *release* of a piece of software. Usually a decimal system is used; a change in the integer represents a major revision. and in the decimal a minor revision.

Vertical Feed. Refers to the feed mechanism in which a *punched card* was kept in a *hopper* in a vertical position.

Vertical Resolution. Refers to a measure of *resolution* determined by the number of *pixels* which can be displayed vertically on a graphic display.

Vertical Scrolling. Ability of the system to move up and down through a page or more of data that is displayed on the terminal screen.

Very Large Scale Integration (VLSI). The process of fabricating integrated circuits on a silicon chip that is having up to 100,000 semiconductor devices.

Video. A term which is generally used for a *visual display unit.*

Video Bandwidth. Refers to the number of dots per second that can be displayed on a television screen or computer monitor. The greater the bandwidth, the higher the number of characters which could be displayed clearly at one time.

Video Computer. A computer which has been designed principally for running commercially produced cartridges that contain games and rote learning programs.

Videodisk. A storage device making use of the high data capacity of equipment which is designed to store television picture data on *disk.* Videodisks are being used to store images which could be accessed and retrieved.

Video Disk System. Refers to a mass storage technology that uses optical lasers to record information by burning holes in a telleurium medium. One disk is able to hold about 55,000 pages of information.

Video Monior. Refers to a display unit that resembles a television set but lacks a speaker or apparatus for detecting UHF/VHF frequencies. A monitor has a direct video connection and accepts higher bandwidth than a television, allowing more characters to be displayed clearly at one time. As the monitor has no local intelligence or control electronics, the computer must have appropriate interfaces to control the monitor.

Video Signal. Means an electronic signal that conveys all necessary information like color, intensity, location, synchronization, about each position on the screen so that the image is kept properly on the screen.

Videotex. Refers to a system of storing a large *tree structured* data base, comprising of pages of text and graphics data, with *user friendly commands*, and accessing *pages* from low cost terminals, often videotex adaptors, using a standard domestic television set for the display screen. Data has been communicated over standrd telephone lines.

Videotex Adoptor. A low cost device having a *modem* and *videotex decoder.* When it is attached to a standard domestic television set and to the public telephone network it allows a user to access a videotex system.

Videotex Decoder. A piece of *software* which is usually, but not always, held in *PROM* on an *integrated circuit* which is able to intepret *videotex* standard codes and generate a videotex *page* on a screen.

Videotex Editing Terminal. A terminal allowing the user to create videotex pages and update a videotex system data base.

Videotex Standards. Refers to the standards which are adopted within a country or by a system supplier for the transmission of data within a *videotex* system. Three main types of videotex standard such as *alphamosaic*, *alphageometric* and *alphaphotographic* are known.

Virgin Medium. A medium completely lacking any information, *e.g.*, a floppy disk which is not *formated.*

Virtual Address. Refers to an address or memory location in a virtual memory system. For example, the location of the address is not related to the actual physical location where the data resides in memory. The logical address will get translated into a physical address by the operating system so that it could be used by the program.

Virtual Address. An address which refers to a *store location* but which must be converted by *address mapping* to get a *real address* referring to a specific *main store* location.

Virtual Circuit. Refers to the path through a *packet switching network* for any particular message if the actual physical path taken by each message gets varied according to the characteristics of the network.

Virtual Machine. Refers to the environment in which all *code* and *data* required to carry out a particular function is executed.

Virtual Machine Environment. Means an environment in which several different users are operating their *applications* within a computer system in such a way that there occurs considerable sharing of *hardware* and *software* facilities.

Virtual Memory. Refers to a system that allows the processor to address memory space beyond the limits of physical memory. In a microcomputer, this is obtained by operating system software that places portions of the user's software and data in auxiliary storage. If these data are needed for execution, the system swaps currently unused material in main memory for the needed sections residing in auxiliary storage, and adjusts addresses as needed. With a virtual memory system, the storage capacity has been found to be much larger than its actual size.

Visi CalcTM. This was the first electronic spreadsheet software which was written for the personal computer It provides solution of mathematical problems through use of a grid system set up on the video screen.

Visual Display Unit. A display unit consisting of a *cathode ray tube.* It is used to display *characters* or graphics representing data read from the *main memory* of a computer.

VLSI. Very Large Scale Integration (acronym, pronounce letters individually).

VMOS. V-channel Metal Oxide Semiconductor (acronym, pronounce first letter individually, rest as one word). A type of NMOS technology in which a V-shaped notch is used to improve density. It is sometimes used for high density dynamic RAM chips.

Voice Grade Channel. A *channel* which is capable of transmitting speech quality signals.

Voice Recognition. Refers to a system that accepts a vocabulary of clearly spoken words as input commands.

Volatile Memory. Memory that does not retain its information content if the power is turned off.

Von Neumann, John. Usually credited with formulating the concept of a stored program computer; for example, controlling the computer by means of a program stored in its internal memory.

V-Series. Refers to a series of a standards which are recommended by the *CCITT*, governing data transmission over telephone circuits, using *analog* techniques, identified by the letter V and numbers 1-57. Common examples include *V.22*, *V.23*, *V.24*. *X-Series.*

VTOC. Volume Table Of Contents (acronym, pronounce first letter individually, rest as one word). A catalog which is used by the operating system to locate data or program files; the files usually reside on disk.

W

W. Write (acronym).

Wafer. *See silicon wafer.*

Waiting Time. The waiting time of a computer *store* is the interval between the moment a *control unit* calls for a *transfer* of data to or from the store and the moment the transfer begins. Also known as latency.

Wait State. The state of the microprocessor unit when it is not being used to process data. *See idle time.*

Walk Down. Successive *partial drive pulses* or *digit pulses* in an incorrectly operating *store* will cause a progressive *irreversible magnetic process* in a magnetic cell. Such a process is known as walk down or *loss of information.* In a correctly operating store, a *steady state condition* (where only *reversible processes* occur) is reached after the application of relatively few partial drive or digit pulses.

Walkthrough. *Dry running.*

WAN. Acronym for *Wide Area Network.*

WangnetTM. A local area network (LAN) system offered by Wang Laboratories, Inc. *See network, local area.*

Warm Restart. *Restart.*

Waste Instruction. Synonymous with *do nothing instruction.*

Wheel Printer. A *printer* which prints characters from the rim of a *print wheel.* The available characters are placed round the rim of each wheel and there is a wheel for each printing position.

Wide Area Network. A *network* connecting computers over long distances, usually using the telephone network or a *packet switch service.* Contrasted with local area network.

Wildcard A *character* or group of characters which represent an undefined character *string*, used in *information retrieval* systems when the user is interested in retrieving items which must contain some specified characters, but where characters represented by wildcards are indeterminant.

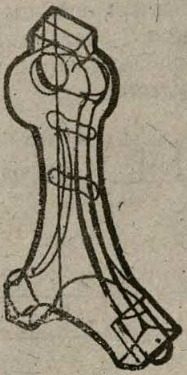
Williams Tube. An electrostatic storage *cathode ray tube* which uses a cathode ray tube with only one gun assembly. The device was developed by F.C. Williams of the University of Manchester and was a significant advance in the development of digital representation.

Williams Tube Storage. A method of storage using a *Williams tube.*

Winchester Disk. Refers to a type of hard drive system initially developed by IBM. It has a sealed non-removable rigid magnetic oxide coated disk. It allows very short access time and high capacity storage as compared with cassette tapes or floppy disk drives.

Window. Refers to an isolated portion of a cathode ray tube screen which is used to display information independently of the rest of the screen display.

Wire Frame Representation. Refers to a three-dimensional representation of an object with hidden lines shown, giving the impression of a transparent object with only its structure visible.



Wire Frame Representation

Wiring Diagram. Refers to a diagrammatic representation of the electronic circuitry for components and *printed circuit boards* for a computer system.

Word. Mans a basic unit of data in a computer *memory*; the unit will be having a predetermined number of *characters* or *bits* to be processed as an entity; *i.e.*, a *program instruction* or an element of data. In many digital computers a *fixed word length* has to be used, but in other machines characters may be grouped to form words of variable length in accordance to the requirements of the particular instructions to be performed.

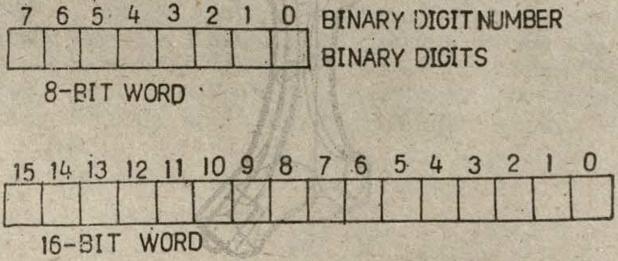
Word Length. Refers to the size of a *word* which is measured by the number of *digits* it contains, *e.g* , a 24-*bit* word will be able to hold numbers in the range -2^{23} to $+2^{23}-1$.

Word Oriented. A computer can be called word oriented if the basic element of data which can be individually *addressed* in *store* is a *word*. The individual *bits* or *characters* within the word may be *accessed* by using certain *instructions* if needed.

Word Processing. Pertaining to a computer program for writing, editing, revising, manipulating, formatting, and printing text for letters, reports, and manuscripts.

Word Processor. A *text editing* device including a *microcomputer* a *visual display unit*, a *printer* and a *software*, *package*. Documents have been initiated on a typewriter-like *keyboard*, and the software permits text manipulation and editing (such as error correction, insertion and tabulation), and storage for later retrieval and printing.

Word Size. Refers to a fixed number of bits, dependent upon the hardware architecture, which acts as the basic logical unit of information The central processing unit is able to process and transfer each word as a separate entity. In microprocessors, word sizes are usually 8-, 16-, or 32 bit. A larger word size needs less instructions per data move. One instruction on a 16-bit machine may move 2 characters of data, while one instruction on an 8-bit machine would move only 1 character. *See microcomputer architecture.*



Word Size

Word Time. The time needed to process one *word* of information in *memory*.

Word Wrap. In word processing, it refers to automatic placement of a word on the next line if that word would otherwise extend beyond the margin.

Work Area. An area within *memory* in which items of data have been stored temporarily during processing.

Work Tape. A *magnetic tape* which has been retained in the computer room for general use during processing.

Word Computer Citizen. A center located in Paris, France which is devoted to placing computer power in the hands of the people and expanding computer literacy to benefit every world citizen.

WP. Word Processing (acronym, pronounce letters individually).

Wpm. Words per minute (acronym, pronounce letters individually).

Wrap Round. As the screen of a *visual display unit* cannot always present all the information called for, the wrap round technique permits further data to get displayed at the start of the top line of the screen, overwriting existing data. The rest of the existing data is then successively overwritten until the bottom line again gets completed and the process gets repeated.

Write. Refers to transcribe data on to a form of *store* from another form of store. An example is the transcribing data on to a *magnetic tape* from the *main memory* of a computer. Data is 'written to' tape rather than 'written on' tape. Contrasted with *read*.

Write-Enable. To allow access to a device like a disk drive, so that the user is having the ability to put information into the device. A write-enable procedure is needed so as to disable a write-protect procedure. *See write protect.*

Write Head. An electromagnet which is used to write on a magnetic medium like *magnetic tape*, *magnetic disk* or *magnetic drum*. Also known as recording head or writing head.

Write Inhibit Ring. A *file protection ring* attached to the *hub* of a *magnetic tape reel* in such a manner that it physically does not allow any *writing* from occurring on the reel.

Write Permit Ring A *file protection ring* attached to the *hub* of a *magnetic tape reel* so as physically to allow data to be *written* to the reel.

Write-Protect. A procedure that prevents inadvertent writing over previously stored information on a storage medium such as a disk. With a floppy disk' a protective tab may be kept on the wrire-protect notch of the jacket to control this feature.

With a hard disk drive, a switch would be engaged. With a tape, a plastic ring must first be removed from the tape.

Write Pulse. Refers to a *drive pulse* which is able to either set the *one condition* of a magnetic cell or writes into the cell.

Write Time. Refers to the time interval between the instant transcription to a *storage device* starts and the instants it gets completed. The write time is thus the *access time* less the *waiting time.* Related to *read time.*

X

X. 24, X. 25. Example of X-Series standards : (i) X.24 is releated to interchange circuit between *data teminal* equipment and *modems* on public digital networks. (ii) X.25 is related to interchange circuits as for X.24, but for connexion of *packet switch services.*

Xerographic Printer. A *page printer* (*i.e.*, a printer in which the character pattern is set for a whole page before printing) which uses principle of *xerography.*

Xerography. Refers to a dry copying process : the image to be copied is projected on to to a plate which causes an electrostatic charge to get discharged where the light falls and retained where the image is black. Resinous powder is then tumbled over the plate, adhering only to the uncharged area. The resin is then transferred to paper or other medium for use as a printing master.

XOR. Exclusive OR (acronym, pronounce first letter individually, rest as one word).

X-Position. Usually refers to the *punching positions* in the second *row* of a *punched card* which from the top, also termed as the 11-position; the top row was Y or 10, the second X or 11, the third 0 and the rest 1-9.

X-Punch. A hole which is punched in the X-position of a *punched crad.*

X-Series. Refers to a series of standards which are recommended by the *CCITT* and governing the interconnexion of users *data terminal* equipment and *modems.* The X-Series standards are more or less an extension of the *V-Series*, taking into account of the development of digital devices and their interconnexion with *analog* facilities. Example are *X-24.*, *X-25.*

X-Y Cursor Addressing. Refers to the location of the position of a *cursor* on a screen, by reference to the X (horizontal) and Y (vertical) coordinate position of the cursor.

X-Y Plotter. Means data plotter.

Y

Y-Edge Leading. As the top *row* of a *punched card* is termed as the Y-row, a card fed long edge first (*parallel feed*), with the top row nearest the read machanism, was regarded to be fed 'Y-edge leading.

Y-Position. Usually refers to the *punching positions* in the top *row* of a *punched card.* It was also known as the 10 position ; the second row was then X or 11, the third 0 and the rest 1-9. Sometimes, the notations X and Y (10 and 11) were reserved.

Y-Punch. A hole which is punched in the Y-position of a card (usually the top *row*, but Y-*position*).

Z

Z. Zero bit.

Zap. (1) Intentional use of a command found in many programs to clear the screen; (2) To overwrite a file unintentionally.

Zero Access Storage. Formerly it was used for describing storage with a very short *waiting time* or *latency*. A waiting time of zero, however, is not strictly possible, and the phrase is not in much use.

Zero Address Instruction Format. In *instruction format* having no *address* part. Such a format is used if no address is needed *e.g.*, when an instruction refers automatically to another *location*, as in *repetitive addressing.*

Zero Balance. Refers to the result of a technique of balance if details and totals are both correct.

Zero Condition. Refers to the state of *magnetic cell* if it represents *zero.* It is also known as zero state and nought state.

Zero Fill. Means replacing all data in a *store* or group of *locations* with the repeated representation of *zero.*

Zeroize. 1. Means resetting a mechanical register to its *zero* position. 2. Means replacing the contents of a *storage area* by pulses representing zero.

Zero Output Signal. The output which is given by a *magnetic cell* in the *zero condition* if a *read* pulse is applied.

Zero Suppression. Refers to the elimination before printing of non-significant zeros, *e.g.*, those to the left of significant digits. The suppression is a function of editing. It is also known as zero elimination.

Zilog. Manufacturers of microprocessors including the Z-80 and the Z-80A.

Z-Net. A local area network (LAN) system similar to Ethernet^{TM}. *See network, local area.*

Zone. 1. Refers to that area of, for example, a *punched card* in which *zone digits* were punched. 2. Part of a *magnetic disk* with a *transfer rate* which is different from the transfer rate of other areas on the same disk; this permits optimum utilization of the surface area. 3. A part of *main memory* which is allocated for a predetermined function.

Zone Bit. An example is that where six *bits* denote each *character*, the two most significant bits may be used in conjunction with the numeric bits for representing alphabetic and special characters. (*zone, zone digit*).

Zone Digit. Refers to the numerical key to a section of a *code, e.g.*, where a hole was punched in the *X-position* of a *column* of a *punched card* it yielded a value to a hole punched in the 2-position of the same column of that card. When a hole were punched in the *Y-position* instead of the X-position, a different value would be given to the hole in the 2-position, and the X-, Y-and (if appropriate) 0 *punching positions* were thus zone digits. Zone digits are used independently of other punchings for control significance, etc.

Zone Punch. Synonymous with *zone digit.*

Zoom. A facility in *graphics software*, which permits the size of an image to be reduced or increased without the need for redefining the image *parameters.*

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Zone. 1. Refers to that area of, for example, a *punched card* in which *zone digits* were punched. 2. Part of a *magnetic disk* with a *transfer rate* which is different from the transfer rate of other areas on the same disk; this permits optimum utilization of the surface area. 3. A part of *main memory* which is allocated for a predetermined function.

Zone Bit. An example is that where six *bits* denote each *character*, the two most significant bits may be used in conjunction with the numeric bits for representing alphabetic and special characters. (*zone, zone digit*).

Zone Digit. Refers to the numerical key to a section of a *code, e.g.*, where a hole was punched in the *X-position* of a *column* of a *punched card* it yielded a value to a hole punched in the 2-position of the same column of that card. When a hole were punched in the *Y-position* instead of the X-position, a different value would be given to the hole in the 2-position, and the X-, Y-and (if appropriate) 0 *punching positions* were thus zone digits. Zone digits are used independently of other punchings for control significance, etc.

Zone Punch. Synonymous with *zone digit.*

Zoom. A facility in *graphics software*, which permits the size of an image to be reduced or increased without the need for redefining the image *parameters.*

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